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Paper Men Oppose Reciprocity With Canada

Representatives of Various Branches of the Industry Appearing Before Committee for Reciprocity Information Ask That No Reduction in Duty Be Made on Papers Now Imported from Canada—Point Out that the Paper Industry Has Already Had One Bitter Experience With Reciprocal Negotiations with Canada

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 20, 1935—Representatives of various branches of the paper industry appeared on Monday before the Committee for Reciprocity Information in connection with the proposed Canadian trade agreement.

They asked, on behalf of the paper manufacturing industry of the United States, that if a reciprocal trade agreement be negotiated with Canada that the United States be granted the same duty rates as those now granted by Canada to every other paper manufacturing nation in the world. They asked also, that no reduction in duty be made on any papers now imported into this country from Canada; and pointed out that reduction of any existing rates will give the same privileges in our market to European nations or others with which Canada can not compete on a cost basis.

Among those appearing before the committee were: Warren B. Bullock, of the Import Committee of the American Paper Industry, for the industry as a whole; A. L. Hobson, of the Association of Newsprint Manufacturers of the United States; Henry D. Schmidt, of the Paperboard Manufacturing Industry of the United States; and R. E. Canfield, for the American Paper and Pulp Association.

A. L. Hobson Speaks for Newsprint

"The manufacturers of newsprint in the United States do not ask that foreign newsprint be excluded from this free market. They only ask simple justice, that the Canadian manufacturers be required to sell their product upon the same terms and conditions that are imposed by the Recovery Act upon the United States mills," said Mr. Hobson.

After pointing out that the placing of newsprint on the free list in 1913 resulted in a migration of the industry to Canada, with the result that the United States is now providing less than 30 per cent of the domestic requirements, Mr. Hobson said:

"With all other American commodities showing increased production in 1934, newsprint actually showed a loss as compared with 1932. Lowered prices of newsprint have resulted in a savings of millions of dollars a year to the newspaper publishers, but the result on the North American industry has been disastrous. Companies having 39 per cent of the entire North American capacity are already in bankruptcy or receivership, or have just passed through some form of reorganization, including five of the eight largest producers on the continent.

"Since this industry appeared at a similar hearing in November on the proposed Swedish reciprocal trade agreement, three United States mills have ceased producing newsprint, one of the three being permanently closed, the others dropping the manufacture of this grade of paper.

"Under the Recovery Act, the United States Industry is compelled to pay fixed minimum wages and to observe certain trade customs.

"Specifically, we ask that the proposed reciprocal trade agreement with Canada does not make it possible for that or any other country to ship newsprint to our market free of import regulations and possible dumping duties. The domestic industry must have legal protection against unfair competition, destructive price cutting and dumping. These safeguards must remain if the United States industry is to exist as a source of supply to domestic newspapers, a means of employment to thousands of men in its mills, and forests and as an investment of hundreds of millions of dollars in capital.

"The domestic producers must insist as strongly as they are able that the burdens which they are not already carrying be not made completely unbearable through any additional concessions to foreign manufacturers. They have had free access to this market for twenty years. We are not asking that they be excluded from that market, but we do ask that they be required to sell their product upon the same terms in the future that are or may be imposed upon the United States industry by the National Recovery Act or similar succeeding legislation."

Henry L. Schmidt Speaks for Paper Board

Mr. Schmidt said that "The United States Tariff Act of 1930 fixed the same rates on paperboard as those in existence for many years prior to the enactment of that Act, namely 10 per cent on unprocessed boards, described in Paragraph 1402, and 30 per cent on processed boards, described in Paragraph 1413. The Act included the following proviso in Paragraph 1402:

"If any country, dependency, province, or other subdivi-

(Continued on page 21)

Forestry Operations Expand In Wisconsin

National Forest Reservation Commission Approves Purchase of 142,659 Acres of Land In North Central Forest Region—Green Bay Barker Co. Constructs New All-Direction Creping Machine for Cannard Co.—Several Additional Machines Planned

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 18, 1935—Another expansion of forestry operations has been announced by E. W. Tinker, Milwaukee, Wis., regional U. S. forester, to the effect that the National Forest Reservation Commission has approved the purchase of 142,659 acres of land in the north central forest region at an average cost of $2.79 an acre.

Purchases include 13,256 acres for addition to the Chequamegon national forest, and 11,709 acres for the Nicolet national forest, both in Wisconsin, at a cost of $74.176.37. Upper Michigan forests will be increased by 33,282 acres at a cost of $74,176.37. Other additions are in Minnesota, Illinois and Missouri. These lands will be managed to perpetuate timber supplies, will return taxes now delinquent, and will furnish employment to CCC workers.

Approximately 13,500,000 acres eventually will come under administration of the U. S. forest service in the Lake States region, according to Mr. Tinker. One-fourth of the country's population lives in the north central area, he points out, and one-sixth of its forest area is within those limits. These forests can be brought to their highest productive capacity within a generation, he says, and eventually should bring an annual yield of 200 to 300 board feet of timber per acre annually. Communities now supporting wood consuming industries can continue to do so and save freight bills running into millions of dollars.

The Wisconsin Conservation Commission, in its annual report just made public, announces that 12,532 acres of trees were planted during 1934 in the state. State nurseries produced 15,155,000 trees, of which 1,486,725 were sold for reforestation of private land. More land is registered under the forest crop tax exemption law now than in any other state.

CCC camps have aided the state materially by building forest truck trails, fire breaks, telephone lines, lookout towers, reforesting and grooming of woodlands. A better equipped and more efficient fire control system reduced the number of forest fires from 3,659 in 1933 to 2,873 in 1934. Most of the fires were held to ten acres or less.

New All-Direction Creping Machine

An all-direction creping machine, the first said to be manufactured in the United States, was shipped recently by the Green Bay Barker Company, Green Bay, Wis., to a Canadian mill, the name of which was not divulged. The machine was constructed for Cannard Company, engineers and designers.

William Cannard, head of the designing firm, says there is only one other all-direction creping machine in the world and that it was built abroad, but is an entirely different type and less capable of superior results than the one made at Green Bay. Mr. Cannard invented the creper and holds the patents on it. He expects to place several additional machines in the near future.

Crepe made on the Cannard machine will stretch in all directions, hence its description. It is adapted for use with stock of any weight, will operate either dry or damp, and can be attached to paper machines so the creping is a part of the continuous process. The machine weighed twelve tons when completed. Plans, patterns and the machine were completed in two and a half months after the order was placed.

News of the Industry

A patent on a method of removing bleachable pigments from paper containing ligno-cellulosic constitutents has been granted to Sydney D. Wells, technical advisor of the Combined Locks Paper Company, Appleton, Wis. The patent was applied for in January, 1933, and was issued March 5 with five claims. It has been assigned to Lewis L. Alsted, president of the Combined Locks Company. The method used is to subject the paper to the action of an alkaline hypochlorite to bleach the pigment. An alkali is added to the mass from time to time throughout the bleaching operation to maintain the alkalinity of the mass and confine the reaction to the oxidation of the color constituents and to preclude chlorination of the lignin present throughout the bleaching reaction.

The Wisconsin Valley Safety Conference, originally planned for June will be held May 2 at Stevens Point, according to a decision of the arrangements committee. Judge Byron B. Park has been made honorary chairman and R. G. Salisbury is general chairman. Numerous committees have been appointed to make the arrangements and develop an attendance of at least 1,000 persons. A parade, with safety floats, is to be a feature. The largest of the sectional meetings will be that of pulp and paper mill workers and executives. The committee arranging for this part of the program consists of H. B. Richmond, Consolidated Water Power and Paper Company, Stevens Point; Frank B. Shemanski, Stevens Point, and Oscar Duus, Tomahawk, Wis. Among those on the advisory committee are J. J. Plzak, Consolidated Water Power and Paper Company, and Franz Rosebush, Nekoosa-Edwards Paper Company.

Dr. J. R. Katz, professor at the University of Amsterdam in Holland, spoke at a meeting last week of the Northeastern Wisconsin Section of the American Chemical Society held at the Institute of Paper Chemistry at Appleton, Wis. His subject dealt with swelling and its study by X-ray spectrography. Dr. Katz is on a year's leave of absence and is lecturing at Cornell University.

Dr. Friedrich Brauns began his duties last week as research associate and instructor in organic chemistry at the Institute of Paper Chemistry, Appleton, Wis. He is an expert in cellulose and lignin, and came from McGill University at Montreal. For the last five years he was Canadian Pulp and Paper Association fellow and research assistant to Prof. Harold Hibbert in the department of cellulose and industrial chemistry at McGill.

J. M. Conway, general manager of the Hoberg Paper and Fibre Company, Green Bay, Wis., was one of the speakers at a two-day labor institute held at Green Bay. Both employers and labor officials were on the program to discuss objectives. Mr. Conway has been invited to speak at a similar institute to be held at Neenah, Wis.

The will of Diedrick W. Bergstrom, late vice-president of the Bergstrom Paper Company, Neenah, Wis., has been admitted to probate court of Winnebago county at Oshkosh, Wis. The estate, valued at approximately $125,000, is left intact to his widow, Mrs. Agnes Forsythe Bergstrom.

Demand for Paper Fairly Active In Chicago

Representatives of Fine Paper Manufacturers Report Increase of Inquiries and Actual Orders—Request for Book and Cover Papers Broadening—Price Structure Continues Generally Steady—Position of Ground Wood Paper Market Unchanged

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 18, 1935—With the Waste Material dealers holding their annual convention next week and with the Chicago Rag Content group this week announcing its program to enhance the use of rag content papers through the "Prestige Papers" drive, the Chicago paper market holds a great deal of interest in addition to the regular market reports.

Marketwise, this waste paper group which meets at the Hotel Sherman beginning March 18, has some problems to solve, according to reports, which indicate that this division of the industry has not as yet found many buyers stocking up in advance of inflation. The market is for the most part dull. The fine paper group finds jobbers fairly well pleased with local demand and with plans for Spring advertising programs which should help appreciably. Manufacturers representatives in the same lines are reporting an increase in inquiries and actual orders. The price structure is reported steady. Books and covers had a satisfactory week and the market was said to be broadening. Groundwoods remained about the same, the newsprint situation still contributing to some uncertainty in the ground wood as well as in its own markets.

Krafts were in better demand, according to local jobbers, though there was no pronounced improvement discernible during the week. Price ranges continued to be comparatively satisfactory. Paperboard noted improvement, while those specialty grades and tissues concerned with the active Spring market found buying much improved over last year. Some apprehension is indicated over the rapidly rising costs without commensurate increases in buying power.

Rag Content Paper Group Active

Chicago is the headquarters for a new, and obviously well formulated, program to enhance the prestige—and thus the use—of rag content papers. Forest Hopkins, very well known to the paper trade, is the director of the Chicago Rag Paper Group which, under the name of "Prestige Papers," will immediately begin to foster the use of better grades of paper. From his office at 12 South Michigan Avenue, Mr. Hopkins sends the following statement:

"During the recent stressful period there has been a grading down by the buying public of high grade merchandise. In the fine paper industry it is generally conceded, by both manufacturers and merchants, that this has been very apparent in the purchase and use of quality bond, ledger and other papers for general office use. During the same period the art of printing—in all its processes—has progressed steadily. That is true of type faces, typography, art work, illustrations and printing equipment.

"Paper is the backbone of printed matter (including stationery, letter-heads, envelopes, invoices, statements and all office forms) and the use of an inferior paper detracts from the utility, dignity and effectiveness of the finished piece no matter how skillfully the converter has designed and executed his work. Therefore, "grading down" the quality of the paper seems an expensive and unfortunate way to trim the budget. This is especially true since the cost of the paper used is not the major item of expense in a printed piece. The present trend is toward the use of better grades in all merchandise. The intrinsic value and prestige value of papers made with rag content has long been established and at the present time there is a definite upward trend in the demand for better papers—Rag Content—discernible."

Mr. Hopkins adds that the Chicago Rag Paper Group proposes, through this new industrial uplift activity, to foster and augment this trend. The new movement has already attracted a great deal of favorable comment and support in Chicago and is expected to spread swiftly to other parts of the country.

News of the Trade

The Chicago Association of Commerce has just released its committee personnel for the forthcoming year—a personnel which includes a considerable number of paper executives. J. P. Brunt, of Brunt & Co. and R. W. Campbell, of Butler Paper Corporation, are listed on the Industrial Development Committee; while George A. Mueller, of the Midland Paper Company, is a member of the membership committee. Division 8 of the association is the Box Board Products Division, listing J. P. Brunt as chairman. Other members are E. P. Lannan, Central Fibre Products Company; George J. Kroeck, Kroeck Paper Box Company; R. H. Ritchie, W. C. Ritchie & Co. and H. Schwenneke, Eureka Paper Box Corporation. The Paper and Envelopes Division, number 38, has Hamilton Vose, Jr., of the Berkshire Papers, Inc., as chairman. Other members are G. A. Mueller, Midland Paper Company; Gordon M. Davie, Vortex Cup Company; James A. Greenlee, Kalamazoo Vegetable Parchment Company; and Merle B. Snyder, of the J. W. Butler Paper Company.

The Swigart Paper Company, intensively covering the Chicago market with various lines, this week presents an attractive folder on Silver-Circle Dullfolding Coated, coming from the Champion Coated Mills at Hamilton. Five exceptional photographs were used in demonstrating the quality of the paper for reproduction work, each coming from the work of some prominent advertiser. The folder also contains a clever indexing and actual swatch of seventy pound white, eighty pound white, hundred pound white, eighty pound ivory and Champion post card. A price list is enclosed. In the same mailing comes a similar folder describing the qualities of Purple-Crest Folding Enamel, the mailing piece doing a nice job of comprehensively representing the halftone printing ability of the paper itself. Splendid color photographs are also a part of this advertising piece.

Sales of Foreign Style Papers in Japan

WASHINGTON, D. C., March 19, 1935—Sales of foreign style papers in Japan during November are reported to have increased 14½ per cent compared with the preceding month, due to the volume of the holiday trade, according to a recent report from the office of the American Commercial Attache in Tokyo. Consumption of chemical pulp during the first ten months of 1934 increased by 2,144 tons in the world situation, due to the increased amounts of wet and mechanical pulp by 29,680 tons over that for the corresponding ten months in 1933.

Boston Paper Market Conditions Still Favorable

Fine Paper Business Reported Exceptionally Good—Wrapping Paper Moving In Fairly Satisfactory Volume—Box Board In Moderate Request for Time of Year—Paper Mill Demand for Various Grades of Waste Paper Slackens, With Prices Spotty

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 18, 1935—The majority of paper merchants made favorable comments on the market for the last week, although in some quarters the demand was less than for the previous week. Replies from fine paper merchants in regard to business ranged from "fair" to "pretty good." At the New England office of a prominent manufacturer of fine paper it was stated that business had been exceptionally good during the week. Wrapping paper moved in fair amounts. In fancy papers, March has improved over February; in one case, at least, the market was very good. Prices of gummed tape have declined, at least two mills making reductions, but the situation at present does not seem to be settled in this commodity. Box boards were in fair demand.

The demand for paper stock, as a whole, became a bit less active, although in one or two cases, prices advanced slightly. In old papers the price of old newspapers was cut 50 cents a ton by one mill, but others paid $4.50 @ $6.00. White blank news declined to 1.15 @ 1.20 from 1.20 @ 1.25, with a falling demand. In bagging, foreign manila rope was quoted at 1.70 @ 1.80, f. o. b. Boston, although it was reported that considerable quantities moved at 1.65 @ 1.70 delivered. Following a little more demand for mixed strings, the price on the minimum side advanced, making the quotation .25 @ .30, compared with a previous range of .17½ @ .30. Dealers have been shipping mixed strings to Europe. No change was reported in new domestic rags. In old domestic rags, the demand for No. 2 roofing stock fell off, with a consequent lowering in price to .92½ @ 1.00 from .95 @ 1.05. No. 3 grade is quotable at .72½ @ .90, against a previous range of .70 @ .80. There was little movement in foreign rags.

News of the Trade

Four very successful meetings were recently held by the American Writing Paper Company in connection with the presentation of the Eagle-A Ne Plus Ultra Typewriter line to the Eagle A service houses of Boston. This line is made up of the former Eagle-A, combined with the Ne Plus Ultra. To this have been added mimeograph papers, Manifold Sulphite Bond, new items of printed "copy" the new line of Trojan Manuscript Cover, and the American Embossed Brief Holders. The American Writing Paper Company is offering to stationers, printers and engravers, through their regular service house channels, this one line of 647 items, which covers every office requirement of cut and boxed papers. Participating in the presentation of the line were R. S. Madden, vice-president of the American Writing Paper Company; J. H. Sweet; R. F. Linsert, advertising manager, and members of the New England office. Meetings were held with Knight, Allen & Clark, Inc., Friday morning, March 8; Arnold-Roberts Company, Friday afternoon; Carter Rice & Co., Corp., Saturday morning, March 9, and John Carter & Co., Inc., Saturday afternoon.

The sales meeting of the Dixie Drinking Cup Company at the office of Stimpson & Co., Saturday, March 9, was a huge success. W. H. Loud, of Stimpson & Co., presided. The salesmen were given a paper blue plate luncheon. Harry Knight, the New England representative of the Dixie Drinking Cup Company, was the principal speaker. The meeting Saturday, March 16, under the direction of Mr. Loud, related to Paper Plates and Containers.

Representing the St. Regis Paper Company of New York and a number of commercial organizations, W. H. Day, manager of the transportation bureau of the Boston Chamber of Commerce, in a petition filed with the Interstate Commerce Commission, seeks the modification of the recent order of the Commission which involves freight rates between the West and New England.

Unless the decision of the Interstate Commerce Commission, which goes into effect on July 20, is changed, it will mean that Western competitors of Eastern manufacturers will be able to reach Eastern markets with what is considered undue advantage over Eastern manufacturers.

Mr. Day also represents the New England Traffic League, Boston Chamber of Commerce, New England Chamber of Commerce, Merchants Association of New York, Chamber of Commerce of Pittsburgh, Norfolk Port-traffic Commission, Baltimore Association of Commerce, Philadelphia Chamber of Commerce, Brooklyn Chamber of Commerce and Rochester Chamber of Commerce.

Maurice A. Blackmur recently took entire charge of the sales service activities and sales promotion of Storrs & Bement Company. Mr. Blackmur was previously an outside salesman for the company in the graphic arts department. For several years he was secretary of the Society of Printers, Boston. Charles Small is to continue his work in the same department.

The Brown Company had a display in a window of Hovey's department store, showing the Solka product, "Oncel," made up into pocketbooks in navy blue, black, white, red and brown.

Book on Patent Law

Patent Law for Chemists, Engineers and Executives by Fred H. Rhodes, Professor of Industrial Chemistry, Cornell University has been published by the McGraw-Hill Book Company, New York.

It is a book of 207 pages planned to give men in technical and administrative work a broad, general understanding of the law of patents, the requirements for a patentable invention and the rights conferred by a United States Patent.

Some of the chapter titles indicate the nature of the book —Utility and Novelty—The Date of Invention—Abandonment—The Form of the Application—Infringement Suit—Testing the Validity of a Patent—Rights of Employers and Employees.

Many patent cases are cited to illustrate the various chapters.

A few of the questions answered are—When may a joint patent be issued?—How much protection does the law afford the man who operates his invention secretly without patenting it?—Can a new use for an old substance be patented?

This book may be obtained through the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York, at $2.50 per copy.

Hydrafiner News

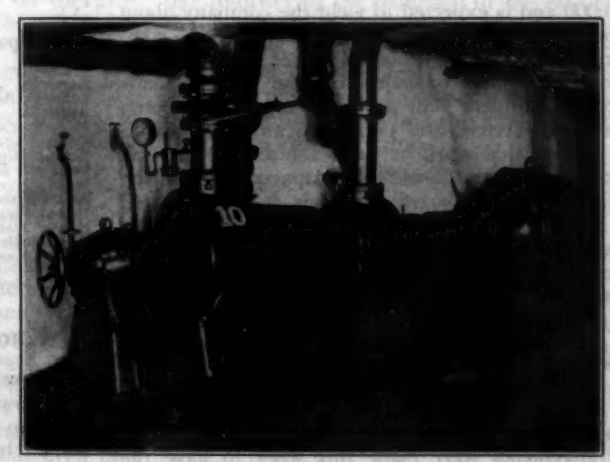
Performance— Here are two Dilts Hydrafiners preparing No. 1 Kraft stock—*Each* Hydrafiner increased production on the paper machine ten tons per day.

Compactness— No other refiners in the world could be installed in this constricted space and give equal results.

It Will Pay You To Investigate

And on high grade coated board the Dilts Hydrafiner prepares stock better.

Here is the first installation —The second Hydrafiner is now installed — Three more on order for this same mill.



—Dilts—
MACHINE WORKS, Inc. FULTON, N.Y.

"Your Paper is *made* in your Beaters—But is it *Hydrafined?*

Philadelphia Paper Market Upswing Continues

Demand for Practically All Standard Grades of Paper Well Sustained—Paper Stock Section Shows No Perceptible Change—Power Plant of Container Corp. of America At Manayunk Reconstructed—Large, Modern Beater Room Completed

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., March 18, 1935—Reports in nearly all lines of the paper industry in this territory indicate that the upswing still maintains. There is, however, no perceptible change in the condition of the waste paper trade.

Association Activities

The March meeting of the Philadelphia Paper and Cordage Association was held as usual in the Rose Room of Hotel Adelphia on Friday. The association was very fortunate in securing for this meeting a masterful speaker in the person of Major W. D. Wilkes, of the Philadelphia Chamber of Commerce. Major Wilkes has had a wide experience and for a number of years was connected with the United States Chamber of Commerce. The officers of this association are doing all possible to make their meetings more interesting, and President Harry S. Platt, Philadelphia representative of the Denney Tag Company, stated that attention for the present is being concentrated on the attendance of the present membership, rather than the acquisition of new members.

Container Corp. Improvements

The Container Corporation of America, located in Manayunk, has completed three main projects of their construction program, namely: reconstruction of boiler plant with one additional Riley-Badenhausen boiler of 175,000 pounds capacity output per hour at 500 pounds pressure, also installation of one 6250 KVA General Electric double extraction turbine. This power plant remodeling cost about $500,000 and is expected to yield the company about $150,000 per year in savings. There has also been completed a large and thoroughly modern beater room for their big 152 inch machine, consisting of one large Shartle breaker system complete with junk and rag removal, settling system and screens, and two small auxiliary breakers. The cost of this work has run about $110,000. A new steel and brick warehouse with capacity for storing about 9000 tons of roll board for their fibre-corrugated plant, has just been built. This building is now in complete operation and will reduce the hitherto unsatisfactory handling costs as well as make available a satisfactory roll storage ahead of their container plant.

Japan Paper Co. Changes

Warwick C. Miller, who for many years has been manager of the Philadelphia office of the Japan Paper Company, has been promoted to a high executive position with the main office of the Japan Paper Company of New York. Arrangements were made this week to have the Paper House of Pennsylvania take over the entire stock together with the employees of the Japan Paper Company, which hitherto had been located in the Witherspoon Building in Philadelphia, and become their exclusive distributors for the Philadelphia Trading area.

News of the Trade

F. A. O'Neill, president of the Paper Manufacturers Company, Inc., 5th and Willow streets, who has been sojourning in Palm Beach, Florida, has returned, very much benefited by his vacation.

The many friends of Edward A. Keller, vice president in charge of sales at Garrett-Buchanan Company, will be glad to hear that he is very much improved and is able to attend his office for a few hours each day.

Otto W. Renner, formerly with the H. C. Davis Paper Company in the Drexel Building, is now associated with the J. R. Howarth Paper Company.

The York Wall and Gilbert Paper mills of York, Pa., will resume operations this coming week, necessary repairs to machinery having been completed. Both day and night shifts formerly employed will be put to work. The mills have been closed this past week because of an accident which damaged machinery.

Scott Paper Company, of Chester, Pa., has declared the usual quarterly dividends of $1.75 on series A preferred and $1.50 on series B preferred stocks, payable May 1 to stock of record April 17.

B. C. Pulp and Paper Exports

Combined exports of pulp and paper from British Columbia during 1934 totalled 345,059 short tons, as compared with 314,671 short tons in 1933 and 257,593 short tons in 1932. Most marked increases were shown in shipments to China, Eastern Canada, United Kingdom and Europe, as well as to Australia. Greatest decline was in exports to South America while minor loss was reported in figures covering Japanese, West Indian, East Indian, Indian and New Zealand shipments. Figures showing exports in pulp and paper classifications arte not yet available.

Comparative total figures for the past three years are:

Country	1932	1933	1934
Argentina	19,752	28,604	3,985
Other S. America countries	6,404	12,693	7,314
Australia	15,314	14,685	26,053
Eastern Canada	3,820	4,620	24,800
China	16,105	26,494	40,063
Europe (Continent)	246	2,027	5,339
India and East Indies	273	1,601	1,339
Japan	59,959	100,257	93,212
New Zealand	4,251	4,254	2,845
United Kingdom	486	347	6,953
United States	130,771	117,733	128,224
West Indies	203	813	588
Other countries	9	543	4,345
Total short tons	257,593	314,671	345,059

Knowlton Bros. Introduce "Absorb-It"

Following several months of experimentation the firm of Knowlton Brothers Inc., Watertown, N. Y. has introduced to the trade a new absorbent paper especially adapted for kitchen purposes. The company claims that it can be used in removing excess grease from foods to make them crisp besides having other uses. The new product is selling under the name of "Absorb-It" and a healthy demand has already been created. For a number of years the company has turned out almost exclusively several high grade and exceptionally soft papers and very recently a member of the firm decided to experiment with samples.

A year of study and research followed before the introduction of the new product. The company is now making it available to homes in this city before placing it before the entire country.

PAPER MEN OPPOSE RECIPROCITY WITH CANADA

(Continued from page 13)

sion of government imposed a duty on any article specified in this paragraph, when imported from the United States, in excess of the duty herein provided, there shall be imposed upon such article, when imported either directly or indirectly from such country, dependency, province, or other subdivision of government, a duty equal to that imposed by such country, dependency, province, or other subdivision of government on such article imported from the United States."

On June 2, 1931, Canada increased its duty on imports of paperboard from 25 per cent to 35 per cent. The result was almost immediately apparent. Our exports to Canada in 1931 totaled 21,000 tons. In 1932 the exports, with the new high duty in full effect, dropped to less than 12,500 tons, a falling off of nearly 40 per cent. In addition to the increase of duty to 35 per cent, on April 7, 1932, Canada imposed an excise tax of 3 per cent of the duty paid value of all imported merchandise, making the rate on unprocessed paperboard 39.05 per cent. Under the provision above quoted, the American rate on Canadian board became automatically 39.05 per cent. Canada at any moment could secure a lower rate of duty on its shipment to this country by reducing its rate, and our rate would immediately drop to a corresponding figure.

This countervailing provision, so-called, was a normal companion process to reciprocal tariffs, by which the United States would grant all nations equal privileges in the American market, providing they did not discriminate against our products. While the Canadian rate against the United States was 35 per cent, plus the excise tax, Canada's rate to all other papermaking countries was 25 per cent.

When the reciprocal trade agreement act was under consideration, this industry protested against the proposal to repeal this proviso in Paragraph 1402, and was represented in a hearing by a Congressional Committee on the proposed act. Before time could permit even the transcription of the testimony then presented, from the stenographic record, Congress passed the reciprocal trade agreement act, including the repeal of this countervailing proviso. Immediately the American duty rate on Canadian paperboard dropped to 10 per cent, while the Canadian rate remained at 39.05 per cent.

Import statistics of our Department of Commerce tell the story of the result. Imports of all paperboards in 1933 totaled about 8,500 tons. Imports in 1934, with the reduction in effect for only half of the year, leaped to 12,500 tons. Today, a single Canadian merchant is announcing to American buyers that he has for sale 6,000 tons for export to the United States at a price of 25 per cent below the American price of the competitive paper board, and this tonnage from a single dealer is more than twice the entire volume of the competitive board imported in 1934. It is true that he tells our Canadian paperboard manufacturing friends that he has only 3,000 tons to sell, but even that figure is greater than the entire imports of this particular board in 1934.

Our protest against this brutal treatment of our Industry by Congress refers particularly to the reduction of 75 per cent of the former duty already in effect on unprocessed board.

In the case of processed board, that is paperboards which are lined, laminated or otherwise treated in the production of a paperboard which is not of uniform material throughout the sheet, we have a slightly less serious situation. Our duty on such boards is 30 per cent under Paragraph 1413. The Canadian duty on such board imported from the United States is 35 per cent plus the 3 per cent excise tax. Canada, however, grants other paper making nations—all papermaking countries but our own—a duty of 25 per cent on such paperboards.

The Canadian attitude toward our paperboard industry is such that several large American paperboard companies have been forced to transfer to Canada a large part of their operations, establishing there factories to produce paperboard for the Canadian market, which American mills formerly enjoyed. Today, with added labor costs imposed on the mills in the United States, these, as well as native Canadian mills, are in a position to export paperboard to this country from mills in Canada, and secure a duty rate only one fourth of that imposed on the American product if it were exported to Canada. Canada's right to force the development of its own industry by tariff walls is granted. We do not admit, however, that our Government should facilitate the increase of unemployment in our mills by granting Canadian paperboard producers a lower rate of duty than that which protects them in their own territory.

It is for these reasons that the paperboard manufacturing industry of the United States considers repeal of the countervailing provision of Act of 1930 entirely unjustified. We are not discussing the fact that Canadian paperboard is now being sold for export to this country at prices less than those prevailing in Canada, for that is a problem for other departments of our Government.

It is for these reasons that the paperboard manufacturing industry believes that it is being moderate in its request that the proposed reciprocal tariff agreement make the Canadian and American tariff rates on paperboard identical. In view of the tariff treatment already given our Industry by the reduction of the rate effective prior to the enactment of the reciprocal trade agreement act, it is unthinkable that any further concessions can be made to Canada on this commodity. In such a case we shall see the same migration of the paperboard industry to Canada which has already ruined the newsprint producing industry of the United States.

Other Speakers for the Industry

Other speakers for the industry made the following statements:

This industry has already appeared at the hearings on proposed trade agreements with Sweden and Finland. The arguments then made against reductions in duties on papers imported from those countries are reemphasized with regard to Canada, for the further reason that some of the existing rates are already too low—so low that the entire price floor of the paper industry is unduly lowered—making it increasingly difficult for the American industry to pay the high wage rates now imposed upon it under the National Recovery Act.

The American paper industry has already had one bitter experience with reciprocal negotiations with Canada. Canada refused to ratify a reciprocal tariff agreement with the United States; but notwithstanding such refusal it gained free entry for its newsprint through the one sided ratification by the United States with the result that this industry migrated to Canada.

The story of this development is so well known to the Government and to the public that it need not be repeated in detail. The resultant damage was described when this

industry was represented at the hearing in November on the proposed Swedish agreement. It was repeated a month ago at the hearing on the Finnish agreement.

Since the hearing on the proposed agreement with Sweden in November, one old American mill producing newsprint has ceased all operation—it could not continue to operate at an increasing loss. Since that time two other mills which were formerly important producers of newsprint, have ceased production of that grade of paper. Since November last, within a comparatively few weeks, hundreds of families of American papermakers have been added to the roll of unemployed workers. This industry is proud of a harmony with its employees unequalled in any other great industry. Its mills have continued operations at a loss for years in order to continue the employment of its workers—in the hope of a brighter day ahead. This Industry, therefore, protests against any further steps to reduce its markets in favor of foreign producers.

In broad terms, and excluding duty free newsprint and duty free pulp, American paper mills would have included some 3000 additional employees on their pay rolls in 1934 had the paper and paperboard imported from Canada been produced on this side of the border. And the average pay roll for these workers would have been 50 cents per hour. This number of employees have been unemployed on the Canadian side of the border producing paper for export to this country, at a lower rate of pay, enabling the Canadian producers to sell their product in this country at less than the American cost of production.

Some of the divisions of the American Paper and Pulp Association which are most directly affected are filing herewith as part of this statement separate detailed statements of their particular problems. This introductory statement is intended to cover only the general situation.

One reason that is advanced for the granting of tariff favors to Canada is the drop in value of its exports to this country compared with 1929. The dollar value of those exports fell heavily, but the comparative figures do not tell the true story. Newsprint is an important item of Canada's trade with the United States. The value of these shipments in 1929 was $132,282,041 and 1934 $68,486,913. However, the decrease in volume of exports of this commodity was only from 2,194,582 tons to 1,956,037 tons. The reduction in volume of imports was less than 10 per cent, but United States production dropped 31 per cent between these same years. The drop in dollar value of these imports was almost 50 per cent. And that drop in value is responsible for the fact that the Paper Industry on this side of the border, producing other and higher grades of paper, is today operating almost universally at a loss.

The price of newsprint is the foundation of all paper prices. The Canadian newsprint mills, operating at such huge losses that there has been a flood of receiverships, almost overwhelming the entire Canadian industry, have so broken the prices of this grade of paper that the effect on other grades of paper made in this country has been disastrous.

The American Paper Industry finds it hard to believe that our Government would negotiate any agreement which will still further penalize the American paper mills to compensate Canadian producers for their senseless policy of selling a basic commodity at far below cost. We believe we have a right to demand protection against such madness.

American statistics of production show that American mills in February operated at 69.6 per cent of capacity. These operating ratios further show that half of the mills are operating at not more than 50 per cent of capacity. It is common practice in the Paper Industry to regard 70 per cent as a minimum ratio of operation under which the mills can meet operating expenses. In many cases 80 per cent of capacity is the figure which the mills must attain in order to meet expenses, and this is true of the groups which have most to fear from Canadian competition.

The February figures quoted show an increase over the production ratios of previous months. In other words, the Industry seems to be working itself out of the zone of losses in which it has operated for five years past. It would be a stunning blow to the Industry to have this effort to reach a basis on which the operation of the mills can meet the pay rolls of the employers without loss nullified by a flood of imports from foreign competitors.

This Industry in its endeavor to cooperate with the National Administration under the Recovery Act is now paying wages in these depression times at least equal to and in most instances higher than those paid in the days of greatest prosperity. This can not continue if foreign nations are to be given advantages over the domestic producers by a reduction of duties. The National Industrial Recovery Act can not effect recovery if our Administration adopts a policy of so reducing duties on competitive merchandise that any increases in the volume of commodities purchased by our people are provided by foreign producers, in countries whose labor rates and costs of production are lower than those imposed on the domestic mills by that Act.

In conclusion this Industry protests with its utmost vigor against any foreign trade agreement with Canada containing any guarantee which would prevent the invoking, if necessary, of any of the existing provisions by which this Government can restrict undue foreign competition. We refer to such provisions of law as the Anti-Dumping Act, Section 3 (e) of the National Industrial Recovery Act, and others of a similar character. Section 3 (e) of the National Industrial Recovery Act was an assurance by this Administration and Congress that industry could safely increase its costs and the Administration would protect it against increased imports. Any guarantee against use of that provision would be an act of bad faith and one against which this Industry must record its opposition.

Printing Papers

The American manufacturers of papers covered by the provisions of Paragraph 1401 of the Tariff Act of 1930 are opposed to any reduction in the present rates of duty on these papers. The competition in certain of these papers now imported from Canada is already such that the imported merchandise is setting a price in the United States below the domestic cost of production, and to meet this condition the rate of duty on these papers should be increased.

American manufacturers are particularly opposed to any foreign trade agreement with Canada containing any guarantee which would prevent the invoking, if necessary, of any of the existing provisions by which this Government can restrict undue foreign competition. We refer to such provisions of law as the Anti-Dumping Act, Section 3 (e) of the National Industrial Recovery Act, and others of a similar character.

The situation involving the production of the papers included in Paragraph 1401 of the Tariff Act of 1930 is the most serious problem of foreign competition affecting the American paper industry today. The competition, particularly from Canada, and the possibilities of greatly increased competition constitute a menace to the entire paper industry, not alone the grades directly affected.

The present competition is such that the Code Authority established under the National Recovery Administration

has authorized the domestic producers of so-called groundwood printing papers to sell many of their products at 80 per cent of cost. In other Codes of the paper industry the provision is that no sales may be made at less than cost, except to meet another member's scheduled price which is not below the other member's cost.

Paragraph 1401 is so comprehensive that it covers the entire field of printing paper, including many special papers, but particularly three chief groups:

1. Groundwood papers, containing a substantial proportion of groundwood or mechanical pulp.
2. Uncoated book papers, chiefly of soda or sulphite pulp, with only a minor percentage or no mechanical pulp.
3. Text paper, a higher grade of book paper, used for high grade books and other printing purposes.

Under the Code organization of the paper industry, these chief groups of printing paper are in two separate subordinate divisions under the General Code which is administered through the Paper Industry Authority.

The ground wood papers are under the jurisdiction of the Ground Wood Paper Division; the uncoated book paper and text papers in the Book Paper Division.

The present tariff rate is equivalent to an ad valorem duty on the ordinary book papers of approximately 15 per cent. On the ground wood papers the rate is equivalent to from 15 to 25 per cent, while on the higher grades the duty is materially less than 15 per cent. The duty rates on these papers are among the lowest duty rates imposed in any part of the paper schedule of the existing Tariff Act.

The relationship of printing papers to the tariff involves conditions that can not be considered solely from a quantitative relationship of tonnage produced here and imported. In no part of the paper industry is the balance between foreign and domestic production so delicate.

A very slight change of the present protective rates would serve to transfer the market for this paper from United States to Canadian mills. Any reduction in the duty, moreover, would apply to Norway, Finland and Sweden which are now shipping book papers for delivery in this country at less than American cost of production.

The situation at present is almost a direct parallel to that which existed when newsprint was placed on the free list. When that happened the newsprint industry moved immediately to Canada. No such shift of markets has ever been known in any other major American commodity. The danger of the same result in the book paper field is no figment of imagination.

In 1910, the United States imported 25,000 tons of newsprint from Canada, none from Newfoundland, and none from Europe; during that year mills in the United States made 1,200,000 tons or 98 per cent of all that was consumed in this country. In 1934 the United States produced less than in 1910 and supplied only 30 per cent of the United States requirements. That is what the removal of the tariff did in the case of newsprint. If the same course is followed in the case of book and other papers, the absence of protection will cause the production of these grades to follow newsprint to Canada. We do not concede that it is a proper American policy to send American dollars to Canada to build up industries operated with Canadian labor, in the production of merchandise to be sold in the United States and which the United States is now equipped to produce.

Today, in Canada, we find a surplus capacity in the newsprint mills equal to at least half of the entire *normal* production of book papers in the United States. The *highest* price at which Canadian newsprint mills are now selling newsprint to the United States is about $3 per ton less than the cost of production of newsprint in this country. It would be only a matter of a short time to divert many of these machines from the production of newsprint to the manufacture of book papers comparable to the standard grades made in this country. With some grades the shift would be little more than a matter of a few hours; and with most of these grades it would be only a matter of weeks.

In view of the history of reciprocity in the newsprint industry, the occasion for apprehension of a similar development in the printing paper field is apparent. With a lowered duty rate applied to Canadian shipments Canada's idle capacity of 750,000 tons per year could easily, with even slight encouragement, be used for the invasion of the American market. Furthermore there is idle capacity in the United States equal to this tonnage, or greater.

Groundwood Papers

With the increased costs of operation in the United States under the provisions of the Recovery Act in full effect during 1934, Canada's exports of ground wood papers increased, as compared with 1933, four hundred per cent, both in dollar value and in quantity. However, the selling price in 1934 was at an average of 20 per cent less than the prices at which this paper was sold in the United States in 1931. Canadian costs did not increase with the enforced higher labor costs imposed on the Paper Industry in the United States by the Recovery Act, and Canada took advantage of this situation to increase its export shipments.

The competition in the printing paper field was chiefly in the lower grades, which ranged in Canadian value from $36 to $55 per ton. These papers, sold by the United States mills at 80 per cent of cost, are priced at from $45 to $60.

In this discussion of imports, it must be realized that a small amount of low priced imported paper is sufficient to set the price for the entire American market. This is one reason why the imports from Canada have forced the American mills to sell at less than cost and meet prices on imported paper in an effort to keep domestic mills in operation.

Statistics of imports given by the Department of Commerce include only such papers as importers "enter" as dutiable merchandise. These figures do not include the large volume of imported paper which is "entered" as standard newsprint, duty free, but which the Customs officials properly reclassify as dutiable papers. These entries represented a large volume of shipments in which an unsuccessful effort was made to evade the vigilance of the Customs officials. There are no available records of all these shipments but it is certain that in 1934 they totaled not less than 4,000,000 pounds as against 5,000,000 pounds entered as dutiable.

Selling their product at 80 per cent of cost, the producers of groundwood printing papers are today operating at less than 70 per cent of capacity. At the current prices these mills can never operate profitably. At normal prices they can not operate profitably at less than 80 per cent of capacity.

Book Papers

The Book Paper Division is one of the most important single groups in the entire American Paper Industry in tonnage of product and in value of output. Any disturbance of its efforts to continue operation under existing conditions will have an immediate adverse effect on the entire American Paper Industry. The production of uncoated book paper in this country, even in the distressed times of 1934 was nearly 1,000,000 tons. Employment in these mills is in the neighborhood of 21,000 persons in productive labor, not including office, executive, sales and

other personnel. The average production in these mills, therefore, is about four tons per month per productive employee. The wages paid these employees total approximately $1,500,000 per month, even with the industry operating far below normal. The actual operating ratio in 1934 was approximately 57 per cent of normal capacity and only 50 per cent of maximum capacity; although in this branch of the industry probably the vast majority of mills require at least 70 per cent operation to break even.

The book paper mills purchase large quantities of materials from other industries whose material prices represent chiefly labor. Coal, sulphur, and lime are only part of the materials needed in the production of this grade of paper. It is safe to assume that for every three workers employed in the book paper mills, employment is given two persons in other industries for raw materials alone.

The foregoing statement shows that each employee in the book paper industry produces fifty tons of paper per year. If duties are lowered so that foreign paper supplants the domestic product to a greater extent than is now the case, every fifty tons of paper imported will send one American employee to the ranks of the unemployed, and one average family of five will be impoverished in the Paper Industry alone. For every 150 tons of paper imported, and diverted from American to foreign mills, three workmen in an American paper mill, and two in other industries will be deprived of employment, thus transferring twenty-five persons from self-support to Government relief.

In this consideration of the money expended by the paper industry for its raw materials the importance of pulp wood must not be overlooked. Tens of thousands of small farmers in all paper making sections of the country find the Paper Industry their source of winter work, and the market for a crop for which payment is made immediately in cash. Pulp wood is the money crop for these farmers, even though their annual cut of pulp wood may be only twenty-five or fifty cords. This is true in all paper making sections, North, South, West and East. Through their sales of pulp wood to the paper mills these farmers not only realize a return on the acreage they have in uncleared land, but they have also a return for winter labor at a time when their farms provide no other produce which they can sell. The paper companies have great tracts of timber land which they use as a pulp wood reserve, but the purchases from farmers total a greater number of cords than are cut from their own lands.

Coal is a typical example of the relationship of paper to other industries. A rough rule of thumb computation in the industry is that it requires one ton of coal to produce one ton of paper. Frequently the requirement is one and one-half, or two tons of coal to each ton of paper. Every importation of one ton of paper, therefore, means the loss to the coal miners of the wages which would be earned in producing one or more tons of coal. The same parallel can be carried through the entire Paper Industry. For instance, money paid for transportation, of which so large a proportion is labor, is another large item, both for the finished paper shipped out of the mill and for the inward bound shipment of raw materials.

Summary

The ground wood paper industry, making a wide variety of cheaper grades closely resembling newsprint, involves many millions of dollars of value of product and wages paid, in addition to the data given for the book paper Industry. The situation is somewhat different, however, and in some respects more serious, for there is extensive and increasing foreign competition in the grades represented by this group. It is in this group that mills have been forced by this foreign competition to sell at only 80 per cent of cost, and this condition cannot continue indefinitely. Any reduction of duties on papers of this grade would destroy this branch of the paper Industry. With the present rate of duty averaging less than 20 per cent, the lowest rate provided for any paper in the entire paper schedule, it is apparent that this group can not survive if its foreign competitors are given advantages even greater than those they now enjoy. A price of less than cost for ground wood printing papers lowers the floor for all higher grades of papers, and while the effect of low duties is direct damage to the ground wood group, the effect pyramids upward into the higher grades. These are recognized grades, one or more, for every $5 per ton variance in price. Lowering the price of one grade by imports at a low figure has an immediate effect, not only in the grade of which the sale is made, but also affects all other related grades in the same degree.

It is for this basic reason, the enforced low price of papers of these grades, due to the necessity for meeting foreign competition, that there has resulted staggering losses in operation in the industry as a whole.

A proper adjustment of the duty rate on printing papers would increase the rate to an extent that would permit the domestic producers of ground wood papers to sell their product at better than 80 per cent of cost, and would help the makers of the higher grades to secure a price for their product commensurate with the cost of production.

The ground wood paper manufacturers can not continue indefinitely to operate at a loss. They must either receive a fair price for their product or cease operation and allow their employees to be fed from the nation's purse.

Wood Pulp

Imported wood pulp is such an important factor in the production of paper in this country that the imports of such pulp from Canada must be considered in the negotiation of the proposed reciprocal trade agreement.

The pulp industry of the United States asks that no provision as to pulp be inserted in the proposed trade agreement with Canada, either the granting of any further protection to the domestic producers than is provided in this country's present laws, or any modification of those existing provisions of law.

Inasmuch as pulp is now on the free list, the negotiation of an agreement with Canada can not transfer, under the terms of the law, this commodity from the free to the dutiable list. Also, international relations between the foreign pulp producers and the American producers of both pulp and paper are on a friendly basis which we all hope will not be disturbed.

Because of this present situation, we do not even consider asking at this time for any imposition of a quota on foreign shipments of this commodity to this country, and we ask no other limitations on imports of this material. On the contrary, we are anxious that the present status be maintained, and that nothing be written into this treaty which would impair the maintenance of the present situation.

While American relations with foreign nations as to pulp exports are now uniformly on an excellent commercial footing, and while the leaders of the pulp industry in most foreign countries are equally desirous with ourselves to continue the present situation, there is always the possibility of efforts to disturb the delicate balance which now exists by producers who are less far-seeing.

For this reason, we believe it would be of mutual advantage to both Canada and the United States to write no language into the proposed agreement which would pre-

vent the exercise by the President of authority now given under existing law to prevent any change in present conditions. As a means to this end, we believe that the proposed treaty should make no mention of pulp, and this would automatically leave the President free to act, if developments required, by application of the Anti-Dumping Act, the provisions as to foreign competition in the National Industrial Recovery Act, or to utilize any of the recognized provisions in existing statutes to prevent unfair foreign competition. No need for any such action is now apparent. Should the need arise from any cause, the United States should not be deprived of the opportunity to take such action by any pledges made at this time.

Specialty Boards

Manufacturers of various paperboards, other than box boards, feel that the passage of the Reciprocal Trade Act reducing the duty rate on Canadian shipments from 39 per cent to 10 per cent was a gross injustice.

These manufacturers ask that the Canadian rate on these products be reduced to the rate levied by the United States on competitive products. They further ask that no pledges or guarantees be given in the proposed reciprocal trade agreement which will prevent further relief being secured under existing laws, such as the Anti-Dumping Act and Section 3 (e) of the National Recovery Act.

When the Reciprocal Trade Agreement Act was passed, Congress acted so hurriedly that the testimony given at a Congressional Committee hearing had not been made available to those voting on the measure. At this Congressional Committee hearing representatives of the American paperboard manufacturers pointed out in precise terms the conditions which would result from the enactment of the measure. What was then foretold has now happened.

At that hearing it was shown that the bill provided for the repeal of the proviso in Paragraph 1402, reading: "If any country, dependency, province, or other subdivision of government imposes a duty on any article specified in this paragraph, when imported from the United States, in excess of the duty herein provided, there shall be imposed upon such article, when imported either directly or indirectly from such country, dependency, province, or other subdivision of government, a duty equal to that imposed by such country, dependency, province, or other subdivision of government on such article imported from the United States."

Two groups were affected by this action: First, the manufacturers of box board and similar types of paperboard included in the National Paperboard Association; second, the manufacturers of specialty boards, such as pulpboard, leather board, imitation leatherboard, fibre board and trunk board. This statement is presented in behalf of the second group.

The repeal of the countervailing proviso of Paragraph 1402 is working havoc in the American market. Canada imposes a duty of 35 per cent plus an excise tax of 3 per cent on the duty paid value of such boards. The rate in Paragraph 1402 was basically 10 per cent, but by the countervailing provision Canadian board was subject to the same duty that Canada imposes upon the American product. This was a normal and proper provision to counteract the discrimination exercised by Canada against the United States, as compared with the duty rate of 30 per cent on such products imported into Canada from other countries.

With the enactment of the Reciprocal Trade Agreement Act, however, the American rate on the Canadian product was reduced 75 per cent, automatically, to the rate of 10 per cent. Canada's rate remained 39.05 per cent.

The outcome has been an increasingly serious development of Canadian sales in the United States. Specific instances of these developments are given in extracts from reports by American producers:

Manufacturer "A"—"For thirty years we have exported more or less board into Canada, up to about two years ago (when the Canadian duty was increased) since which time we have exported none. The market for leatherboard in Canada is less than the capacity of the Canadian mills so that it would be more likely that the Canadian mills would seek business here than that the American mills would seek business in Canada." This manufacturer adds that Canadian mills have no source of raw material, and outbid American mills for leather waste which, with a lower labor cost, is made into leatherboard and shipped back to the American market at less than the American prices.

Manufacturer "B"—"In former years Canada was a large consumer of leatherboard made by the American mills but this market has now been entirely lost. If the costs of the American mills are further increased under the N.R.A. (which has happened since this report was made) Canadian board will be shipped into this country. True reciprocity would mean an equalization of rates."

Manufacturer "C"—"Said customer will probably require four carloads less of the domestic board during 1935 than it used during 1934, through the purchase of board from ———— a Canadian manufacturer. The loss of this consumption will mean a decrease in the gross business of this company of not less than $8,500 during 1935, of which at least $2,800 represents the cost of direct labor which would have been paid American citizens. A substantial part of the balance represents indirect labor and transportation and raw materials. Affiant believes that most if not all of the other sixteen American manufacturers of fibre board will lose orders in a proportionate amount." The loss of the single order referred to in this statement involves a larger sum than Canada's total exports of this type of board in 1934.

The manufacturers in the United States believe that the present rate of duty on this and similar boards will result in a loss of occupation by American workmen. The Canadian labor rates in producing this merchandise are from 30 to 40 per cent below those paid in the American mills, and labor is an unusually high proportion of the cost of production of leather and fibre boards.

Vegetable Parchment

The American manufacturers of Vegetable Parchment believe that in view of the reduction of the duty on this commodity in the recently concluded trade agreement with Belgium, efforts should be made to secure a reduction in the duty rate on exports of this commodity into Canada. At least, the United States mills should be granted the same rate of duty that is given to the Belgian producers of this commodity.

The Belgian trade agreement recently signed so reduces the duty on imports of Belgian Parchment that it can be delivered in the United States at less than the American cost of production. The Belgian product, furthermore, is the highest quality made in any European country, and under present conditions Belgian Parchment is admitted into Canada at 30 per cent, as compared with a discrimination against the American Parchment. Under the rate of duty fixed in the Belgian trade agreement, Canadian Vegetable Parchment is dutiable upon entry into the United States at about 25 per cent. The Canadian rate is 35 per cent plus 3 per cent excise tax. The producers in the United States should have the same rate as is levied against the competitive Belgian product, if not the lower rate applied by the United States on the imported product.

Rates on Paper to New Orleans

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 18, 1935—The Interstate Commerce Commission has reconsidered a former decision of its in connection with paper and paper articles rates from Wisconsin, Minnesota, Michigan, and Canada to New Orleans, La. In this regard the Commission in its new report says:

"1. On further consideration, relief from the long and short haul provision of Section 4 of the Interstate Commerce Act in rates on paper and paper articles, in carloads, from points in Wisconsin, Minnesota, Michigan, and Canada, to New Orleans, La., authorized, modified to the extent of excluding paper and paper articles, other than newsprint paper.

"2. Authority to establish and maintain rates on napkin paper, in carloads from the same origins to New Orleans, without observing the long and short haul provision of Section 4, denied."

The Commission has also rendered a decision in the case of the Wisconsin Paper & Pulp Manufacturers' Traffic Association against the Ann Arbor Railroad Company, in which it says in part:

"Applicable rates for the transportation of printing and wrapping paper, including other paper articles grouped therewith, in carloads, for transportation from manufacturing locations in Wisconsin and Michigan, to destinations in official territory, not proven by the evidence to be unreasonable."

New Book on Colloid Chemistry

A feature of the recent annual meeting of the Technical Association was a lecture given by Prof. A. W. Thomas of Columbia University on "Solutions of Basic Salts of Aluminum." Prof. Thomas has written a book on "Colloid Chemistry" which has been published by the McGraw-Hill Book Company, New York. It has 512 pages and is included in the International Chemical Series of the publisher.

In this book, the attempt has been made to treat colloidal dispersions from the standpoint of crystalloidal chemistry. It is easier to consider inorganic dispersions from the physical angle but the author feels that such a treatment is inadequate unless supplemented by considerations of the chemical nature of the constituents.

The book is written for those who are familiar with elementary inorganic, organic and physical chemistry. Some of the chapter titles are as follows: Clouds and Smokes; Optics-Braurian Movement; Liquid Disperse Systems; Dialysis and Ultrafiltration; Preparation of Colloidal Solutions; The Nature of Micelles; Wetting; Sorption; Foams; Emulsions; Gels and Jellies; and Carbohydrate Colloids.

The book may be obtained through the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York, N. Y., at $4.00 per copy.

W. J. McChesney Goes with Missisquoi Corp.

It is announced that W. J. McChesney, formerly with the Mohawk Paper Mills, Inc., of Cohoes, N. Y., is now connected with the Missisquoi Corporation, of Sheldong Springs, Vt., at their New Offices at 41 Park Row.

Sweden Increases Pulp Production

Preliminary estimates of chemical pulp production in Sweden during the year past indicate an average increase in output of 12.8 per cent. Relatively the largest increases occurred in the production of unbleached sulphite and sulphate pulps. The 1934 output of the latter was partially restricted due to the fact that the curtailment agreed on in 1933 was in a certain degree postponed and was not in full operation until 1934. It was announced at the end of December that the restriction of sulphite pulp production through the SPS (Sulphite Pulp Suppliers) agreement would be continued through 1935, and it was thought that the present rate of output to consumption could be expected to create a stable market. Advance sales for 1935 delivery were about 50,000 tons less than that which had been disposed of at the end of 1933. Production of mechanical groundwood during 1934 was curtailed by 50,000 to 60,000 tons (metric tons of 2,205 pounds) owing to the severe water shortage during the earlier part of the year. By the end of November the 1934 production was practically sold out, and by the end of December between 60 and 70 per cent of the 1935 production had been disposed of. Several large orders were also reported as placed for 1936 production.

John F. Burke Reelected Union Head

[FROM OUR REGULAR CORRESPONDENT]

HUDSON FALLS, N. Y., March 18—John F. Burke, of this village, was re-elected president of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers at the bi-annual convention held last week at Buffalo. Among those elected vice-presidents were Morris LaBelle, Ottawa, Ont.; Herbert W. Sullivan, Worcester, Mass.; John Sherman, Port Angelus, Wash.; Jesse W. Taylor, Stephen A. Stevens, Thorold, Ont.; Raymond Richards, Wisconsin Rapids, Wis. Bert Doody, of Palmer, N. Y., was elected treasurer and George C. Brooks, of Franklin, N. H., auditor. A resolution calling for an increase in the salary of the president from $4,500 to $5,500 was defeated as was also a resolution endorsing formation of a labor party. Delegates voted in favor of a general increase in wages of 7 cents an hour on the grounds that living costs are rising rapidly in all sections of the country. Endorsement of the thirty-hour-weekly program of the Federation of Labor was given while the delegates voted support in the fight for old age pensions and unemployment insurance.

Reading Forms Research Department

At the sales convention of the Reading Iron Company held recently at Reading, Pa., the company announced the formation of a Commercial Research Department, composed of skilled technicians of the highest caliber, whose services are available, without charge, to the man who wants to be sure of putting the right pipe in the right place.

Officials of the company voiced the conviction that their organization is entering upon a new era of growth and development. In support of their belief, they pointed out that the Reading Iron Company has already found it necessary to enlarge its sales staff, adding important "key" men to take care of the increased demand for Reading Genuine Puddled Wrought Iron products.

This view of the future was borne out by B. C. Forbes, famous economist and editor, who, speaking at one of the noon meetings of the convention, complimented the Reading Iron Company on its aggressive preparations for a substantial upturn in business.

May Drop Some Paper Codes

WASHINGTON, D. C., March 18, 1935—A list of 286 NRA codes was laid before the Senate Finance Committee last week by Donald R. Richberg, executive director of the National Emergency Council, as among those that should be dropped. The list includes all codes for industries employing fewer than ten thousand persons, and also thirteen service codes.

A further list bringing the total of 550 is still in preparation, accurate figures on employment in these industries being not yet available.

Among the codes which Mr. Richberg recommends to be dropped are the following:

Newsprint, Waxed Paper, Waterproof Paper, Paper Bag, Envelope, Glazed and Fancy Paper, Paper Container, Expanding and Specialty Paper Products, Fiber Can and Tube, Fluted, Cup, Pan Liner and Lace Paper, Gummed Label and Embossed Seal, Looseleaf and Blank Book, Paper Drinking Cup and Round Nesting Paper Food, Paper Disc Milk Bottle Cap, Paper Stationery and Tablet, Photographic Mount, Sanitary Napkin and Cleansing Tissue, and Tag; also Paper-Making Machine Builders, Papermakers Felt, China Clay Products, Talc and Soapstone and Cordage and Twine.

Paper and Pulp Authority Submits Code Amendment

WASHINGTON, D. C., Mar. 20—The Code Authority for the paper and pulp industry, it has been announced, has submitted for NRA approval a proposal to revise the present provision in the code known as Amendment No. 2, which makes mandatory upon industry members the payment of code assessments. The provision also empowers the Code Authority to collect code assessments and make expenditures called for under the budget.

The proposed revision is merely of a clarifying nature, with certain minor changes in phraseology.

Suggestions or objections concerning the proposal, copies of which are available at NRA headquarters in Washington, may be submitted to Deputy Administrator W. J. Brown before April 3.

To Reopen Turners Falls Mill

TURNERS FALLS, Mass., March 19, 1935—Local mill officials have received word that the International Paper Company is to reopen its mill here March 20. A crew of 50 men are already at work preparing for the opening.

James M. Murray, of the New York office of the company is here to direct the opening of the plant. Franklin L. Darrell is local manager. Two of the three paper machines are to be started first, but whether the third machine will start depends upon orders. About 110 employees are needed with two machines running and 160 with all three running.

Collins Mfg. Co. Continues Unchanged

In order that its many customers and friends may be properly advised, the Collins Manufacturing Company, North Wilbraham, Mass., formally announces that, despite recent rumors to the contrary, the company will continue to operate, develop, and expand its sales and advertising sales program with the sales personnel intact.

James Fitzgerald, who has been promoted to the superintendency of the Collins Manufacturing Company, has been with the company for two years as assistant superintendent. Mr. Fitzgerald has been identified with the manufacture of fine paper for about fifteen years.

Martin Cantine Dead

KINGSTON, N. Y., March 19, 1935.—Martin Cantine, aged 69, president of the Martin Cantine Company, well known manufacturers of coated papers and president of the Tissue Company, tissue paper manufacturers, both of Saugerties, N. Y., died in the Kingston Hospital, March 17, after a brief illness of pneumonia.

Mr. Cantine was born in Saugerties, 69 years ago, a son of Peter Cantine, and a descendant of early Huguenot and Holland Dutch settlers of Marbletown in Ulster County. He founded his paper manufacturing business in 1888, when he was 22 years of age.

Mr. Cantine was a former mayor of Saugerties and had been a Republican presidential elector from 1908 to 1932. He was a member of the Holland Society of New York, the Huguenot Society, the Kingston Club, the National Republican Club and the Ulster County Society.

He is survived by his wife, Mrs. Anna Potts Cantine; a sister, Mrs. Lydia Cantine French; a son, Holley Rudd Cantine, of Saugerties, and a daughter, Frances Cantine, of New York.

Funeral services will be held Wednesday afternoon in the Dutch Reformed Church at Saugerties, and burial will be in the family plot.

Coast Paper Men Return from Orient

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., March 9, 1935—H. C. Pim, foreign sales representative of the Pacific Mills Limited, Vancouver and Ocean Falls, B. C., and W. Barclay, sales manager for the Powell River Company, recently returned to B. C. from a three months trip to the Orient in the interests of their companies. Both men left Vancouver on the same boat and returned together on the Empress of Japan, and while their routes did not entirely overlap, they worked to a certain extent co-operatively in various territories. Their visits were largely intended as gestures of good will with a view to cementing the friendship of customers already patrons of their companies.

A steady and increasing market for Canadian newsprint exists in both China and Japan, and especially in the latter country, according to Mr. Pim. Only 250,000 tons of newsprint is produced annually in Japan, so that the market for newsprint there is greatly in excess of domestic production.

Personal visits of Canadian business men to the East will do much to build up friendly relationships between Canada and the Orient, according to Mr. Pim and Mr. Barclay. They believe that this is the only possible way to develop business with the East.

Howard Bond, Strong As a Bear

Under the title of "Strong As a Bear," the Howard Paper Company, of Urbana, Ohio, is sending out an unusually effective and attractive sample book of Howard bonds. An announcement accompanying the sample states that "Howard bond's unusual strength and remarkable whiter-than-snow color are the result of twenty-one years' experience, skilled workmanship, expertly chosen paper making facilities and an abundance of pure artesian well water. Add to these, proven performance and all-around utility, and Howard bond stands out preeminently as the paper for a multitude of uses.

"Howard bond is available in fourteen attractive and easily discernible colors, six distinctive finishes, with envelopes to match. It is made in all standard weights and sizes."

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Birmingham, Ala.—The Birmingham Paper Company, 2101 Fifth avenue South, manufacturer of envelopes and kindred paper specialties, has approved plans for expansion in paper converting plant, with installation of additional equipment to double approximately the present plant capacity. Cost close to $25,000, with machinery. T. Marcus McClennan is vice-president.

Everett, Wash.—The Weyerhaeuser Timber Company, Pulp Division, Tacoma Building, Tacoma, Wash., plans extensions and improvements in steam-operated electric power plant at Mill A, Everett, including installation of new equipment for increased capacity. Work will be carried out in connection with new mill unit for production of unbleached sulphite pulp, recently referred to in these columns, on which work is scheduled to proceed at once. Pulp mill will be equipped for initial capacity of about 150 tons per day, and will be located on the river front at Everett.

Salem, Mass.—The Philbrick Paper Company, 75 Washington street, is planning construction of new two-story and basement building on Bridge street, to be used for storage and distributing service. Cost reported close to $30,000, with equipment. Proposed to begin work in near future.

Napanoch, N. Y.—The Rondout Paper Mills, Inc., has been chartered under state laws with capital of $100,000, to take over company of same name, which recently filed notice of dissolution, with local mill for the production of tissue, crepe and kindred paper products. New organization will continue operation of mill, as in the past. The incorporators are identified with Kelly & Co., Inc., 215 Wilson avenue, Newark, N. J., paper products and paper manufacturers' supplies, including E. C. Kelly and J. E. Sheil.

St. Marys, Ohio—The Auglaize Box Board Company, manufacturer of container board products, paperboard specialties, etc., has engaged Edward T. Turner, 228 Central avenue, Dayton, Ohio, consulting engineer, to make surveys and estimates of cost for proposed extensions and improvements in power house at mill recently referred to in these columns. It is proposed to install new boiler and other equipment for increased capacity. George M. Fissel is secretary.

New York, N. Y.—The Simplex Package Corporation has been organized with capital of 200 shares of stock, no par value, and plans operation of local plant for the manufacture of paper plates, paper cups and allied paper products. Incorporators of new company include I. F. Black, 79 West Ninety-second street, New York; and M. E. Grim, 145 Richmond Valley road, Tottenville, S. I.

Jacksonville, Fla.—The Union Bag and Paper Corporation, Woolworth Building, New York, N. Y., and City Commission and Board of Duval County Commissioners, Jacksonville, have concluded arrangements with Seaboard Air Line Railroad Company, Jacksonville, for construction of branch line to Dames Point, Eastport district, site of proposed new pulp and paper mill, and converting plant of first noted company, recently referred to in these columns. Work on railroad line will begin at once, and is reported to cost about $150,000. Likewise, work is scheduled to begin soon on new multi-unit paper mill noted, reported to cost over $3,000,000, with machinery. It is understood that arrangements for site between company and municipal and county officials have been concluded, covering tract of about 1,200 acres of land, with waterfront facilities.

Troy, Ohio—The Gummed Products Company, manufacturer of gummed paper tape and allied paper specialties, is awarding miscellaneous contracts for new plant addition, lately noted in these columns, comprising electrical work to the Archiable Electric Company, and plumbing and heating to the H. J. Osterfeld Company, Troy. Also, awards are being made for certain equipment, including stokers to be furnished by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.; boilers to the Henry Vogt Machine Company, Louisville, Ky.; and contract for elevator equipment to the Warner Elevator Manufacturing Company, Cincinnati, Ohio. Work will include a new one-story mill, totaling 50,000 square feet floor space, and power house, with cost estimated in excess of $200,000. John H. Deekin, Times-Star Building, Cincinnati, is architect.

Buenos Aires, Argentina—The du Pont Rayon Company, Inc., 350 Fifth avenue, New York, N. Y., manufacturer of viscose rayon products, a subsidiary of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has formed a new subsidiary organization under the name of Ducilo, S. A. Productora de Rayon, to manufacture similar products in South America. A substantial interest in new company will be held by Comptoir des Textiles Artificielles, Ltd., Paris, France, likewise manufacturer of viscose rayon products. A site is being secured near Buenos Aires for a large mill, comprising group of one and multi-story units, with power house, machine shop and other mechanical structures. New plant will be equipped to give employment to about 1,000 persons for initial operations and is reported to cost over $2,000,000, with machinery. It is proposed to begin work at an early date.

New Companies, Etc.

Cleveland, Ohio—The Service Paper Corporation has been incorporated with capital of $25,000, to manufacture and deal in paper products of various kinds. The incor-

porators are A. H. and M. E. Ganger, East Ohio Gas Building, Cleveland.

Hickory, N. C.—The Piedmont Paper Company, Inc., has been chartered with capital of $10,000, to deal in paper goods of different kinds. The incorporators are Alexander George and Louis Schenck, both of Hickory.

New York, N. Y.—The Oversea Paper Corporation has been organized with capital of $20,000, to deal in paper products of various kinds. New company is represented by Garfield & Seligson, 285 Madison avenue, New York, attorneys.

New York, N. Y.—The Handi Resilient Slip-Stitching Process, Inc., has been incorporated with capital of 100 shares of stock, no par value, to deal in pulp, fiber, cellulose and allied products. The incorporators are Sidney Spier, 328 Ocean parkway, Brooklyn. N. Y.; and Melville Lyman, 315 East 88th street, New York.

Boston, Mass.—The Martin Banknote Company has been incorporated with capital of $100,000, to manufacture and deal in paper specialties for banknote and kindred purposes. Charles M. Clark, Jr., is president; and George R. Shaw, 2d., 141 West Second street, South Boston, treasurer and representative.

Joliet, Ill.—The Continental Wall Paper Mills, Inc., has filed notice of company dissolution under state laws.

New York, N. Y.—Newman & Biggio, Inc., has been incorporated with capital of $20,000, to manufacture and deal in paper converted products for commercial service, ruled papers, etc. The incorporators are Joseph M. Newman, 2081 Cruger avenue, Bronx, New York; and Robert Biggio, 123 84th street, Brooklyn, N. Y.

Seven Paper Mills Have Perfect Record

Seven out of twenty-seven pulp and paper mills companies established perfect records in a no-accident contest recently conducted by the Employers Mutual Liability Insurance Company of Wausau, Wis. The contest included 1189 employers, representing more than 50 industries in ten states. Workers in pulp and paper mills companies competed during the six month period from July 1 to December 31 in an effort to reduce accidents in their operations.

The pulp and paper mills companies were grouped according to the man-hours worked during the contest period. Final standings of the contestants were determined by the accident frequency which is the number of accidents per million man-hours worked. Workers in the twenty-seven pulp and paper mills companies put in 7,258,365 man-hours and two hundred thirty-nine accidents occurred giving this group a final frequency of 32.9 accidents per million man-hours.

All those with perfect records and winners in each group were awarded plaques or certificates in recognition of their achievement. Both employers and employees of the competing establishments are enthusiastic over their safety records and are competing in another contest during the first six months of 1935.

Albert Paper Box Co. To Move

The Albert Paper Box Company, Inc., now at 142 Harrison Place, Brooklyn, announces its removal to Front and Main streets about April 1. Its new location will provide greatly increased plant facilities.

The company will continue its sales policy of seeking to serve trade efficiently under its officers: A. L. Fogel, president and treasurer; G. J. Dubey, vice-president; A. V. Fogel, secretary.

Bids and Awards for Government Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 20, 1935—The Government Printing Office has announced the following paper awards for paper purchased on the open market. John F. Post will furnish 61,200 pounds (600,000 sheets) of 28x34 white sulphite bond paper at 6.06 cents per pound and Barton, Duer & Koch Paper Company will furnish 5,940 pounds (30,000 sheets) of 32x42 buff English finish book paper at 5.65 cents per pound. Bids for these items were received on March 6.

The Whitaker Paper Company will furnish 2,444 pounds (51,000 sheets) of 29½x31, 50 per cent rag white manifold paper at 16 cents per pound, bids for which were received on March 4.

The Printing Office has received the following bids for 24,400 pounds of 50 per cent rag colored index: at 13.96 cents per pound, Walker, Goulard Plehn Company, Whiting Paper Company and Mathers-Lamm Paper Company; at 11.866 cents, Marquette Paper Company, George W. Millar & Company, and Aetna Paper Company.

For 2,000 pounds of 50 per cent rag, blue laid cover paper at 13.09 cents; R. P. Andrews Paper Company, Reading Paper Mills Inc., and Mathers-Lamm Paper Company.

For 5,000 pounds of sulphite manila paper; Old Dominion Paper Company, at 5.15 cents.

For 300,000 pounds of manila calendered tag board, Barton, Duer & Koch Paper Company, at 7 cents.

For 3,239 pounds of white bond paper, R. P. Andrews Paper Company, at 14.43 cents; Whitaker Paper Company, 12.2655 cents; and Aetna Paper Company, 12.2655 cents.

Otsego Falls Paper Mill Starts

KALAMAZOO, Mich., March 18, 1935.—The latest addition to paper manufacturing operations in this district, is the Otsego Falls Paper Mill, Inc., at Otsego, Mich.

The company has leased the Number 1 Bardeen plant from the Allied Paper Mills, of Kalamazoo and started production in February. They are making straw board for corrugated and report a good demand for their product, in fact they are unable to keep up with orders received. Forty-five men are at present employed and this number is expected to be doubled when the plant is operating at capacity.

The Bardeen plant has been idle for three and one-half years since the Allied Paper Mills abandoned operations there. The equipment consists of two Beloit Fourdriniers, with 84-inch and 96-inch trim; nine beaters and two jordans.

D. H. Greene is president of the Otsego Falls Paper Mill and H. J. Finder is secretary and treasurer. These gentlemen also operate the Prairie State Paper Mill at Joliet, Ill. J. B. Watters is general superintendent, and Mr. Moran who was formerly with the Central Paper Company at Muskegon, Mich., is production superintendent.

Dwight Stocker Made Vice President

DETROIT, Mich., March 18, 1935—At a recent meeting of the board of directors of the Detroit Sulphite Pulp and Paper Company, Dwight Stocker, for several years connected with the Detroit Sulphite Pulp and Paper Company and recently assistant to the president, was appointed vice president in charge of production.

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BUSINESS SHOWS GAINS UP TO 30 PER CENT IN JANUARY AND FEBRUARY

Business is improving. Substantial gains in many lines from satisfactory up to 30 per cent as compared with a year ago were made during January and February. This report is based on the poll of the Business Advisory and Planning Council which consists of fifty-two members and represents practically every phase of trade and industry.

The Council, which convenes regularly in Washington to discuss the administration's policies and practices and to offer counsel on business affairs, includes many of the foremost industrial and financial leaders. H. P. Kendall, chairman of the Council, stated that three-fourths of the members attended the monthly meeting of the Council last week and told of increases in business volume or profit or both thus far this year. In a statement for this Council Mr. Kendall said:—

"In the periods of rapid change in the first stages of recovery the public mind is apt to become so confused with immediate issues of detail and week-to-week industrial swings as to miss opportunity to judge progress or to stop to reanalyze underlying fundamentals.

"It is significant to note the results of a poll of the attending members of the council taken at the close of our monthly meeting, March 4, 1935.

"These men represented companies forming a cross-section of most types of American industry. Three-quarters of them reported increases in volume and/or profit varying from 'satisfactory' to '30 per cent' in 1935 as compared with the corresponding period of 1934.

"Those reporting no gains or decreases were confined to companies connected with the heavy industries, railroads, cotton and some milling products. The enlarged government housing program will be an effective aid to the heavy industries and through them to transportation and the consumers goods sector.

"We have believed this progress was possible; we have hoped to see it realized. It is cheering to have it made a matter of record.

"After all, judgment on recorded performance is sounder than the sum of all the theories and opinions put forward as fears for the future or panaceas for past mistakes.

"No thinking man today will question the soundness of the American dollar in either our own or in world markets. Based on its present gold value it is as sound a currency as exists today.

"No thinking man will question the present security of our credit structure, and certainly no one will question the fact of our abundance of natural resources.

"Regarding government expenditures for public works and relief, far more important than arguments as to whether the sum shall be any of the particular figures that have been mentioned is the problem of proper organization and the choice of projects to insure the greatest possible advance toward our objectives.

"A consistent cooperative effort, freed from partisan chiseling, either industrial, labor or political, toward the re-employment of effective workers in the regular channels of industry, keeping reform constructive for the public good without destroying the necessary good with the bad, can have no other result than acceleration of the progress that has already been made since March 3, 1933."

ACCOMPLISHMENTS IN PAPER RESEARCH AT THE NATIONAL BUREAU OF STANDARDS

Important advances have been made during the past year by the National Bureau of Standards in the field of standardization of paper and paper-making.

Considerable progress was made in the development of paper testing standards, which is done in cooperation with the Technical Association of the Pulp and Paper Industry. Under the direction of B. W. Scribner, a member of the Bureau staff, the association's Paper Testing Committee completed the revision of the association's standard methods for amount of mineral coating, sampling, conditioning, basis weight, tearing strength, and opacity, and completed additional standards for acid-soluble iron, pH of paper extracts and amount of arsenic. Progress was made in the revision of the other association standards for testing strength, thickness, bulk and fiber composition and in the development of methods for grease resistance, water permeability, and printing properties. Accomplishments in the bureau's researches consisted of the development by F. T. Carson, of several improved paper testing devices including a precise instrument for testing air-permeability; improvement of the TAPPI method for opacity, and development of opacity standards for calibration of opacity testing instruments, by D. B. Judd; and development of instruments for various reflection measurements by R. S. Hunter.

The usual attention was given to properties of papers. With the assistance of a fund established with the Litho-

graphic Technical Foundation by three paper manufacturers, additional information was obtained, by C. G. Weber and M. N. V. Geib, on the relation of the properties of offset lithographic papers to their printing qualities. Previous work indicated that improved register of successve color prints was obtained with minimum hydraton of paper fiber and with as many fibers as possible lying in the machine direction of the paper, and further work confirmed these findings. Also, considerable improvement in register was obtained when the papers were conditioned in a higher atmospheric humidity than that of the press room, because the moisture lost by the papers during the printing balanced that taken up by them from the wet printing plate and this prevented expansion of the papers between printings. At the request of the chairman of the Paper Technical Committee, Federal Specifications Board, Federal Specifications for file folders, sheathing papers, brown print paper, blue print paper, tags and paper towels were developed with the assistance of the industrial organizations concerned. F. T. Carson found that the air permeability tester developed by him is a very useful tool for studying the structure of paper, and obtained the important finding that from precise air-permeability measurements, the size of the pore spaces in papers can be calculated.

Paper-making studies of the manufacture of papers from new and old rags, from cornstalks, and from American flax, and the use of sweet potato starch for beater sizing, were completed. Some of the more important results obtained with rags, were that the degree of strength and of stability of the papers as judged by the heat test, were commensurate with the strength and cellulosic purity of the rags; and that the stability of the papers was adversely affected with increasing acidity, particularly below pH 5, and by use of more than 1% rosin in sizing the papers. In the work on cornstalks, the use of both the whole stalk and the stalk with the pith removed was studied, but, as was expected, although satisfactory wrapping and writing papers were produced, the yield of paper making fiber was very low as compared with that from fibrous materials in use. The American flax fiber was produced under the auspices of the Textile Foundation, with the cooperation of the Bureau of Plant Industry and Clemson College. The paper-making experiments showed that the long fiber produced paper equal to that from new linen rags, but that the woody portions of the stalk were not completely removed, and caused specks and shives in the paper.

Improvement of the retting process appears to be necessary to secure satisfactory flax fiber.

While no further studies were made on the preservation of records, because of lack of funds for the purpose, considerable assistance was given to librarians and others interested, in the application of the bureau's findings relative to both the selection of record papers and the maintenance of favorable storage conditions for paper bearing record material.

Weekly Production Ratio Report

Reports to the Paper Industry Authority show the following Over-All Production Ratios for the designated periods.

	Reporting Mills		Total Production Ratio
	Number	Capacity	
September, 1934	292–299	.....	59.4%
October, 1934	297–394	.....	64.7
November, 1934	385–399	.....	61.7
December, 1934 (a)	396–404	.....	62.1
January, 1935	397–411	.....	65.8
* Week ending February 9, 1935	404	166,039	69.7
* Week ending February 16, 1935	401	162,744	70.6
* Week ending February 23, 1935	388	161,910	69.0
* Week ending March 2, 1935	287	116,770	68.8

Detailed statistics showing the number of mills reporting by ratio groups are given below:

	Number of Mills Reporting Week ending			
Ratio Limits	Feb. 9 1935	Feb. 16 1935	Feb. 23 1935	March 2 1935
0% to 50%	122	124	125	84
51% to 100%	282	277	263	203

* Subject to revision.

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours" were as follows:

September, 1934	62 per cent
October, 1934	63 per cent
November, 1934	56 per cent
December, 1934 (a)	53 per cent
January, 1935	61 per cent
February 9, 1935	67 per cent
February 16, 1935	67 per cent
February 23, 1935	66 per cent
March 2, 1935	68 per cent

(a) Capacity and percentage data exclude December 25, 1934.

Revised statistics covering delinquent mill returns will be shown in later reports.

Zellstofffabrik Waldhof Celebrates Its Fiftieth Anniversary

Through the courtesy of Castle & Overton, Inc., United States selling agents, 200 Fifth avenue, New York, THE PAPER TRADE JOURNAL has just received a handsome brochure issued by the Zellstofffabrik Waldhof in celebration of its fiftieth anniversary as manufacturers of pulp. All the materials used in the manufacture of the brochure, including the paper, the transparent cellulose, the rayon cord used to bind the pages, are made of pulp manufactured by the Waldhof concern which is probably the largest maker of sulphite pulp in the world and it is certainly one of the oldest.

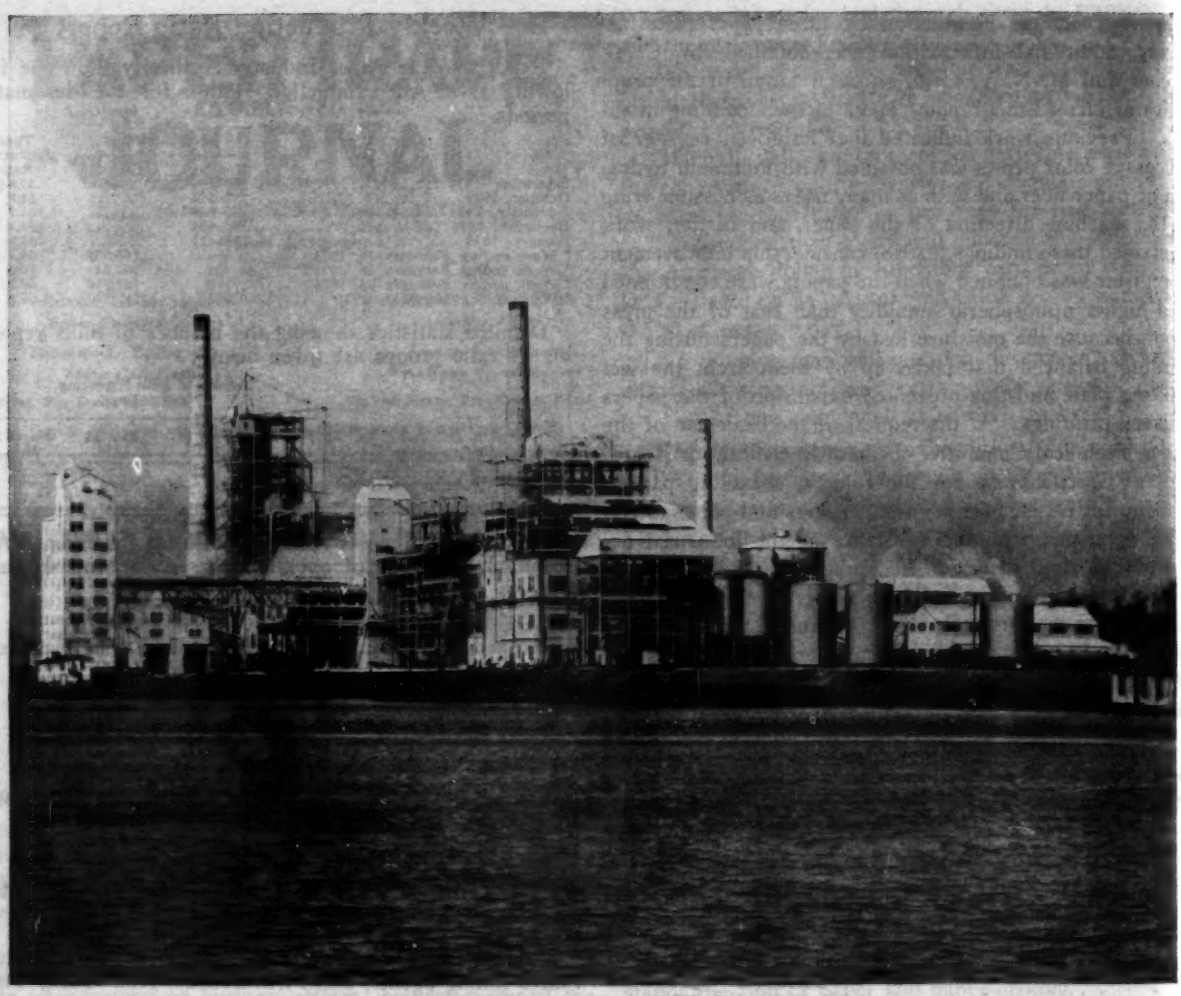
The head office of the firm is in Berlin and large factories are operated in Mannheim, Tilsit, Ragnit, Kelheim and Corsel. Pictures of these factories, handsomely done in colors are presented. Briefly, the brochure well reflects the size, importance and general high standing of Zellstofffabrik Waldhof in its particular field.

New Standard Oil Bulletin

"The Lubrication Engineer—His Value to You" is the subject of an illustrated bulletin just issued by the Standard Oil Company (Indiana), with offices at 910 South Michigan Avenue, Chicago, Ill.

This monograph describes how the lubrication engineer works and how an organization can profit by using his services. Many interesting cases of the value of this service are cited.

Copies of this bulletin may be otbained upon application.



New Mathieson Plant at Lake Charles, Louisiana

LAKE CHARLES—A New Source of Alkali

AT Lake Charles, Louisiana, the Southwest now has its own alkali supply. Effective February first, Mathieson's new Lake Charles Plant started regular shipments of alkali to consumers in this growing industrial area.

As a dependable source of supply, the Lake Charles Plant is unique in many respects. The plant itself is of advanced design, including a number of engineering features embodied in such a plant for the first time. Its location is particularly favorable both from the standpoint of ample supplies of raw materials and of distribution facilities for the finished products.

Radiating out of Lake Charles are the lines of three great railroad systems—the Southern Pacific, the Kansas City Southern and the Missouri Pacific. The fast freight schedules from Lake Charles, maintained by these carriers, permit timing of deliveries in *hours* rather than days, even to points such as St. Louis and Kansas City.

In addition to speedy rail delivery service, the new Lake Charles Plant offers substantial savings in transportation costs both by rail and by water to consumers in the South and Southwest, and by water to points on the Atlantic and Pacific seaboard, along the Gulf Coast, and on inland waterways including the Mississippi River and its tributaries. Water shipments are loaded on steamers and on barges at our own plant docks at Lake Charles.

We shall be glad to discuss with consumers the advantages of Lake Charles as a source of supply of alkali—in carloads, trainloads or shiploads.

Mathieson Chemicals

© THE MATHIESON ALKALI WORKS (INC.) . . . 60 EAST 42ND STREET, NEW YORK, N. Y.

Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Lake States TAPPI Discusses Waste Disposal

The Lake States Section of the Technical Association of the Pulp and Paper Industry met at the Conway Hotel, Appleton, Wisconsin, Tuesday evening, March 12. A. T. Gardner, Combined Locks Paper Co., Chairman of the section, presided. More than 180 members and guests were present.

Stream Pollution Abatement

After opening the meeting, Mr. Gardner introduced Dr. C. A. Harper, Wisconsin State Health Officer, who spoke briefly of the encouraging progress of the stream pollution abatement work in Wisconsin, emphasizing the fine co-operation of the cities and mills with the state officials engaged in this work.

Advisory Committee on Waste Disposal

The function and activities of the advisory committee on waste disposal for the Wisconsin Pulp and Paper Industry were outlined by H. A. Rothchild, Kimberly-Clark Corp., chairman of the committee. The committee was organized in 1926 and its primary function has been to advise the state on conditions in the industry. While a threat of hearing, injunction, or fine hangs over the paper industries under the law, he explained that the policy of the state has been one of helpfulness toward the solution of the pollution problem.

State Sanitary Engineer Speaks

L. F. Warrick, State Sanitary Engineer, Madison, Wisconsin, spoke on "The Role of the Pulp and Paper Industry in Pollution Abatement." The role of the mills in a general program for pollutional abatement is twofold; first, waste utilization to the economic limit, and second, development and installation of effective methods of treatment of pollutional mill waste. The interest of the state in its streams resolves into the factors of health, industrial and agricultural needs, beauty and recreation. He pointed out that the tourist trade brings the state about $150,000,000 annually and that the fishing facilities alone are worth from $10,000,000 to $15,000,000 each year. Showing slides Mr. Warrick explained the reduction that has been made in the cases of water born diseases.

Advances Made in Fiber Loss Reduction

The next presentation of the evening was "Ways and Means for Pulp and Paper Mill Waste Utilization or Disposal," by C. M. Baker, Engineer, A.P.P.A. and J. M. Holderby, Assistant State Sanitary Engineer, Madison, Wis. Mr. Holderby discussed briefly the measurement sampling, and analysis of mill waste. In reviewing recent surveys on paper mill waste it was shown that after a period of steady decrease, the average fiber loss increased in 1934. Fiber loss from sulphite pulp mills has behaved similarly. Losses from ground wood pulp mills have remained relatively constant in recent years. Mills not in any of the above classifications have shown continued decrease in amount of fiber lost in waste. In emphasizing an objective of 1 per cent fiber loss and 20,000 gallons waste flow per ton of product, Mr. Holderby pointed out that despite the increase of the average fiber loss in 1934, 32 per cent of the mills studied had bettered this objective.

C. M. Baker substantiated Mr. Holderby's statements that no paper mill or pulp mill need have more than a 1 per cent fiber loss and cited some operating conditions with which he was familiar.

Adolph Kanneburg, Chairman of the State Committee on Water Pollution, gave a short talk in which he called attention to the fact that Wisconsin residents are becoming more and more conscious of their rights on the rivers and lakes of the state and that the time has come when something must be done to prevent excessive pollution.

After a short general discussion of the advantages and disadvantages of the so-called metropolitan system, the meeting was adjourned.

Among those present were:

W. A. Johnson, Continental Paper and Bag Corporation, Marinette, Wis.; J. S. Mohr, Chromium Corporation of America, Milwaukee, Wis.; A. T. Gardner, Combined Locks Paper Company, Combined Locks, Wis.; E. W. Rasmussen, Continental Paper and Bag Corporation, Marinette; D. J. White, same company; D. H. Beisel, Wadhams Oil Company, Milwaukee; H. W. Gochnauer, Northern Paper Mills, Green Bay, Wis.; T. E. Xistris, A. E. Broughton & Co., Appleton, Wis.; J. J. Leibhauser, Riverside Paper Corporation, Appleton; Michael Gerhay, Kaukauna, Wis.; W. L. Glass, Shartle Brothers Machine Company, Middletown, Ohio; C. W. Cassell, Institute of Paper Chemistry, Appleton; E. M. Leavitt, Thilmany Pulp and Paper Company, Kaukauna; Robert Smith, Mike Heigl, C. H. Nystrom of Northern Paper Mills, Green Bay; V. Harold Woehler, Fox River Paper Company, Appleton; R. Brenzel, Thilmany Pulp and Paper Company, Kaukauna; W. H. Falatick, same company; L. P. Penhollow, Wadhams Oil Company, Appleton; K. E. Olson, Tomahawk Kraft Paper Company, Tomahawk, Wis.; J. A. Extrom, same company; H. W. Sherman, Northern Paper Mills, Green Bay; William Fitzgerald, Northern

Paper Mills, Green Bay; Gus Klaus, same company; P. Vogt, Interlake Pulp and Paper Company, Appleton; C. O. Bruden, Wallace & Tiernan Inc., Madison, Wis.; Otto Kress, Institute of Paper Chemistry, Appleton; M. V. Molsherry, General Electric Company, Milwaukee; R. J. Le Roux, Interlake Pulp & Paper Company, Appleton; T. W. Frank, same company; R. Zilske, same company; James Foote, Fox River Paper Company, Appleton; J. H. Graff, Institute of Paper Chemistry, Appleton; H. W. Morgan, same; F. W. Stolz, Fort Howard Paper Company, Green Bay; R. A. Schmid, Kimberly Clark Corporation, Neenah; W. F. Swan, Limestone Products Company, Menominee, Michigan; R. S. Erdlitz, Central West Coal Company, Menominee; A. E. Bachmann, Kimberly Clark Corporation, Neenah; R. J. Zaumeyer, same company; J. W. McIntyre, Institute of Paper Chemistry, Appleton; C. Riggles, Kimberly Clark Corporation, Neenah; M. J. Ketter, Hoberg Paper and Fibre Company, Green Bay; W. H. Burns, Valley Iron Works, Appleton; Harold Donckers, Joseph Roskams, Hoberg Paper and Fibre Company; H. C. Sperka, Thilmany Pulp and Paper Company, Kaukauna; P. D. Bradley, Green Bay; L. F. Bunde, W. B. Giese, Hoberg Paper and Fibre Company, Green Bay; Grover Keeth, Marathon Paper Mills Company, Rothschild, Wis.; Carl Bertram, Vocational School, Appleton; G. D. Muggleton, Combined Locks Paper Company, Appleton; J. A. Auchter, Nekoosa-Edwards Paper Company, Port Edwards, Wis.; A. M. Vanderberg, same company; A. F. Kretzien, Fox River Paper Company, Appleton; A. J. Detril, Standard Oil Company, Green Bay; C. Murray, Crane Company, Oshkosh, Wis.; Herb Heilig, Vocational School, Appleton; J. E. Watson, Wisconsin Wire Works, Appleton; E. B. Miller, Foxboro Company, Chicago, Ill.; C. F. Watson, Nekoosa Edwards Paper Company, Port Edwards, Wisconsin; J. W. Youngchild, same company; A. J. Hayes, same company; E. E. Den Dooven, Hoberg Paper and Fibre Company, Green Bay; C. F. Shockey, Thilmany Pulp and Paper Company, Kaukauna; E. O. Bryant, Institute of Paper Chemistry, Appleton; K. B. Morey, Neenah, Wis.; J. D. Fine, Mosinee Paper Mills, Mosinee, Wis.; G. F. Enderlein, Mosinee Paper Mills; Fred Schwartz, Fort Howard Paper Company, Green Bay; H. L. Voss, Mosinee Paper Mills; E. R. Purdy, Stevens Point Pulp and Paper Company, Stevens Point, Wis.; A. G. Kernin, Mosinee Paper Mills; F. R. Lillie, Crane Co., Chicago; R. A. Nugent, Nekoosa Edwards Paper Company, Port Edwards; E. J. Vickman, Hoberg Paper and Fibre Company, Green Bay; E. B. Morse, Fannon Trading Company, Appleton; W. A. Fannon, same company; H. W. Bialkowsky, Gilbert Paper Company, Appleton; Buster Griffiths, Heller & Merz Inc., New York; R. M. Radsch, Appleton Machine Company, Appleton; J. A. Lumpert, Kimberly-Clark Corporation, Kimberly; Louis De Bauche, Hoberg Paper and Fibre Company; W. C. Christensen, same company; Lloyd Lang, Kimberly Clark Corporation, Neenah; C. E. Curran, Forest Products Laboratory, Madison; F. J. Morrison, Clinton Company, Clinton, Iowa; C. E. Saecker, Appleton Machine Company, Appleton; C. J. Gerlach, Hoberg Paper and Fibre Company, Green Bay; C. R. Seaborne, Appleton; Lee Sargent, Hoberg Paper and Fibre Company; Alex Stryanov, Marathon Paper Mills Company, Menasha, Wis.; Glenn Carroll, Combined Locks Paper Company, Appleton; E. A. Pirch, Neenah; J. A. Staidl, Thilmany Pulp and Paper Company, Kaukauna; M. S. Apple, Fort Howard Paper Company, Green Bay; P. A. Paulson, Appleton; K. R. Karlson, Union Bag and Paper Corporation, Kaukauna; A. W. Agrell, Patten Paper Company, Kaukauna; E. R. Schafer, Forest Products Laboratory, Madison; G. J. Brabender, Marathon Paper Mills Company, Rothschild; E. C. Jacobi, Standard Oil Company, Green Bay; G. F. Pauley, Monsanto Chemical Company, Chicago; W. K. Kolb, Combined Locks Paper Company; J. J. Meyer, Badger Paper Mills, Peshtigo, Wis.; C. C. Crusius, J. M. Voith Company, New York; G. C. McNaughton, Madison, Wis.; A. J. Luth, Nekoosa Edwards Paper Company, Port Edwards; E. G. Artz, Milwaukee, Wis.; J. E. Martin, Northern Paper Mills, Green Bay; R. D. McCarron, Wisconsin River Paper and Pulp Company, Stevens Point; C. M. Baker, American Paper and Pulp Association, New York; R. L. Shaw, W. A. Jones Foundry and Machine Company; S. D. Wells, Combined Locks Paper Company, Combined Locks; R. L. Davis, Interlake Pulp and Paper Company, Appleton; Adolph Kanneburg, State Commission on Water Pollution, Appleton; E. H. Voigtman, Kimberly Clark Corporation, Neenah; G. H. Spencer, E. D. Jones & Sons Company, Pittsfield, Mass.; A. L. Honstron, same company; E. P. Gleason, Nekoosa Edwards Paper Company, Port Edwards; L. E. Pagel, Allan S. Hirsch, Lawrence Fleiger, Marathon Paper Mills Company, Rothschild, Wis.; N. L. Malcove, Continental Paper and Bag Company, Marinette, Wisconsin.

The Technical Man Sells His Services

The McGraw-Hill Book Company has recently published Edward Hurst's book—"The Technical Man Sells His Services." It is a book of 239 pages, 5½ x 8 inches.

The whole purpose of this book is to help technical men find jobs by applying analytical methods to the problem. Avoiding generalities, "inspirational" patter, and academic theorizing, the author shows the reader how, by selling his services instead of asking for a job, he can convert the employer's "no" into a "yes."

As an avocation the author, an engineer in manufacturing, has for eighteen years been helping engineering students to get jobs. Now this book sums up the results of this unusual experience and clearly shows what methods have worked and what have not in getting jobs.

With a series of actual cases, the author illustrates the application of successful methods of job-getting. Among the occupations covered in these cases are mechanical engineer, chemical engineer, machine designer, electrical engineer, sales engineer, architect production engineer and cost accountant.

Professor Erwin H. Schell, Chairman of the Placement Committee at Massachusetts Institute of Technology, where a private edition of this book was studied by the 1933 graduating class, says, "We have been impressed with Mr. Hurst's extraordinary wide experience in the placement of technical graduates as well as the unusual efficacy of his methods."

This book is obtainable through the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York, at $2.00 per copy.

Starts Brooklyn Testing Station

The opening of a Brooklyn Testing Station on March 1 has been announced by the United States Testing Company, Inc., whose main headquarters and plant are in Hoboken, N. J.

The new branch of the company is located at 43 Morgan avenue, Brooklyn. The opening of this branch is in line with the Testing Company's policy of establishing branch laboratories close to the organizations using its testing facilities in order to give quicker service and to be handy for personal discussion of questions.

New England TAPPI and Connecticut Valley Superintendents Meet

Materials of Construction was the subject discussed at the Joint Meeting of the New England Section of the Technical Association of the Pulp and Paper Industry and the Connecticut Valley Division of the American Pulp and Paper Mill Superintendents Association held at the Nonotuck Hotel, Holyoke, Mass., Saturday, March 16, 1935. Papers were presented at the afternoon session and the evening program consisted of a St. Patrick's Day dinner-dance which was attended by about 250.

J. D. Miller Discusses Materials

James D. Miller of the York Haven Paper Company, York Haven, Pa., and chairman of the Technical Association Materials of Construction Committee, was the first speaker. He pointed out the losses to industry due to corrosion. For the paper industry the cost of labor and materials represented in the loss amounts to $2.93 per ton of product, of which materials alone account for 85 cents per ton.

Mr. Miller then proceeded to indicate the important materials used for equipment in the various stages of the pulp and paper making process. From the pond to the mill cast iron is used for log drags. In the chipper plant hard facing alloys of Cr. W and Cr. Co W composition is being adopted.

In the sulphite pulp mill Cr-Ni. steels are being used for relief lines. The 27 per cent Cr. alloys have not been found to be successful. For digester linings silica bricks are standard but carbon bricks and alloy steel bonded to the shell have been tried. The cost in each case has been high.

One kraft pulp digester is completely lined with carbon bricks. Soapstone is still being used for lining recovery furnaces and a water jacketed body type of recovery furnace has worked out successfully.

For pulp screen plates bronze is most generally used but chromium plating, 18-8 stainless steel and Swedish Avesta steel have been used to advantage.

In beaters and jordans bronze knives are generally used for fine papers, steel, 14 Cr.-steel and Monel metal are used for jordans. In general, stainless steel is used to obtain a cutting effect, and bronze to get a brushing action. Monel gives a combination of these actions.

For piping no standard practice is evident.

On the paper machine stainless steel rolled or ordinary steel is used for save-all bodies. For suction box covers, end of grain maple is most generally used. Carbon and plastics have also been used and stainless steel has been used for the boxes themselves. Nitrided steel has been used for wet end rolls.

For bleaching Durachlor has been found advantageous. Thiokol added to fused sulphur makes a material that is being used for tanks. For fourdrinier wires brass and phosphor bronze. The metalayer process of adding metal was described.

Corrosion Resistant Alloys

Guy H. Baker of the Durion Company, Dayton, Ohio, was the second speaker. He discussed corrosion in general. Duriron is an iron containing about 14½ per cent Si. It is of particular value for handling corrosive acids and alum solutions.

Mr. Baker pointed out the necessity for alloy specifications since the number of trade names on the market is very confusing to the buyer. For sulphite relief, he recommends the Alloy KA2S Mo.

Future Meetings

On April 26th the New England Section will meet at Worcester, Massachusetts. On May 18th it will meet at the Living House in Dalton, Massachusetts and on June 14th and 15th it will meet with the Superintendents at the Toy Town Tavern, Winchendon, Massachusetts. Those who attended were as follows:

Mr. and Mrs. George Carroll, American Writing Paper Company, Holyoke, Mass.; George Congdon, Robertson Paper Company, Rockville, Conn.; George Forman, Inland Paper Board Company, Norwich, Conn.; Charles O'Neil, Holyoke, Mass.; John Kennedy, American Writing Paper Company, Holyoke, Mass.; Edward Thom, Howard Smith Paper Company, Cornwall, Ontario; Mr. and Mrs. H. S. Leonard, Merrimac Chemical Company, Everett, Mass.; Mr. and Mrs. A. F. Brunell, Papermakers Chemical Company, Williamansett, Mass.; Miss Helen U. Kiely, American Writing Paper Company, Holyoke, Mass.; Mr. William N. Welch, New York; Mr. and Mrs. Leonard Taylor, American Writing Paper Company, Holyoke, Mass.; Mr. and Mrs. Albert Southard, American Writing Paper Company, Holyoke, Mass.; Mr. and Mrs. Fernand Willemain, American Writing Paper Company, Holyoke, Mass.; Fred Schneider, Hampden Color & Paint Company, Springfield, Mass.; Fred Clark, Skinner & Sherman, Inc., Boston, Mass.; Mr. and Mrs. John Browne, Chemical Paper Company, Holyoke, Mass.; Miss Edith Browne, Holyoke, Mass.; Mr. and Mrs. T. R. Polson, Valley Paper Company, Holyoke, Mass.; Mr. and Mrs. George Hardacker, Sinclair Company, Holyoke, Mass.; Mr. and Mrs. Peter Sinclair, Sinclair Company, Holyoke, Mass.; F. A. Abbiati, Merrimac Chemical Company, Everett, Mass.; Mr. and Mrs. L. M. Yoerg, American Writing Paper Company, Holyoke, Mass.; Mr. and Mrs. F. A. Curtis, American Writing Paper Company, Holyoke, Mass.; Frank Greaney, J. Levy & Company, New York City; Mr. and Mrs. Dale Augsburger, Duriron Company, Boston, Mass.; Mr. and Mrs. R. H. Doughty, Fitchburg Paper Company, Fitchburg, Mass.; Mr. and Mrs. R. J. Proctor, Fitchburg Paper Company, Fitchburg, Mass.; Mr. and Mrs. G. E. Mangsen, Fitchburg Paper Company, Fitchburg, Mass.; A. H. Gilmore, C. H. Norton Company, N. Westchester, Conn.; George Thompson, Sr., Whiting Paper Company, Holyoke, Mass.; Miss Madelyn Thompson, Holyoke, Mass.; Raymond Winkler, Chemical Paper Company, Holyoke, Mass.; Mr. and Mrs. Joseph Bario, Taylor-Logan Company, Holyoke, Mass.; A. F. Bailey, DuPont Company, Providence, R. I.; Cornelius Stapley, Chemical Paper Company, Holyoke, Mass.; Mr. and Mrs. Thomas Kern, Sears Company, Holyoke, Mass.; Mr. and Mrs. Henry Inglis, Chemical Paper Company, Holyoke, Mass.; Mr. and Mrs. Dwight Bartlett, American Writing Paper Company, Holyoke, Mass.; Mr. and Mrs. F. C. Schueler, Erying Paper Co., Erving, Mass.; M. V. Horgan, American Writing Paper Company, Holyoke, Mass.; R. G. Macdonald, Secretary TAPPI, New York City; Harold Lavallee, Clinton Com-

pany, Holyoke, Mass.; Jack O'Connell, Case Mfg. Company, So. Manchester, Conn.; Mr. and Mrs. Lester Crouse, Penick & Ford Company, Springfield, Mass.; Mrs. Arthur Caldwell, Holyoke, Mass.; Mr. and Mrs. R. F. Driscoll, Smith Paper Company, Lee, Mass.; Mr. and Mrs. Michael Gee, Holyoke, Mass.; Mr. and Mrs. T. M. Pomeroy, Crane & Company, Dalton, Mass.; Mr. and Mrs. Charles Champion, Millers Falls Paper Company, Millers Falls, Mass.; Mr. and Mrs. Al Duquesne, Holyoke, Mass.; S. W. Shannon, Groveton Paper Company, Groveton, N. H.; Mr. and Mrs. Arthur Loomis, Heller & Merz Company, Springfield, Mass.; Mr. and Mrs. Raymond E. Kilty, Staley Company, Springfield, Mass.; M. J. Baker, Franklin Paper Company, Holyoke, Mass.; Thomas Flaherty, American Writing Paper Company, Holyoke, Mass.; Mr. and Mrs. F. W. O'Rourke, General Dyestuffs Company, Boston, Mass.; Fred Lovenberg, Mathieson Alkali Company, Previdence, R. I.; Mr. and Mrs. Gordon Booth, Gair-Thames Company, New London, Conn.; Mr. and Mrs. Stephen Stapley, Chemical Paper Company, Holyoke, Mass.; J. T. Leecock, American Writing Paper Company, Holyoke, Mass.; William J. Burke, American Writing Paper Company, Holyoke, Mass.; Guy Baker, Duriron Company, Dayton, Ohio; J. D. Miller, Continental Paper & Bag Corp., York Haven, Pa.; W. L. Foote, B. F. Perkins Company, Williamansett, Mass.; H. M. Grasselt, Collins Mfg. Company, N. Wilbraham, Mass.; Charles A. Minor, Minor Laboratory, Springfield, Mass.; J. J. O'Brien, The Paper Mill, Boston, Mass.; W. O. Johnson, Strathmore Paper Company, Woronoco, Mass.; James Merrill, So. Hadley Falls, Mass.; J. L. Merrill, Valley Paper Co., Holyoke, Mass.; M. F. Donahue, George W. Prentiss Company, Holyoke, Mass.; Walter F. Bachelder, Geo. W. Prentiss Company, Holyoke, Mass.; John Schniewind, Testing Machines, Inc., New York City; E. W. Boley, Geo. W. Prentiss Company, Holyoke, Mass; Francis A. Harris, Geo. W. Prentiss Company, Holyoke, Mass.; J. T. Fitzgerald, Collins Mfg. Company, N. Wilbraham, Mass.; C. J. Backus, Collins Mfg. Company, N. Wilbraham, Mass.; G. S. Willey, Collins Mfg. Company, N. Wilbraham, Mass.; A. G. Cardwell, Krebs Pigment & Color Company, Newark, N. J.; W. O. Thompson, Krebe Pigment & Color Company, Newark, N. J.; H. T. Barker, Bird & Son, Inc., Walpole, Mass.; H. E. Crippen, Solvay Sales Corp., Boston, Mass.; W. J. Landfare, Appleton Wire Works, Inc., Appleton, Wisconsin; Carl Z. Draves, Ludlow Mfg. Associates, Ludlow, Mass.; A. C. Drufva, Magnuson Products Corp., Brooklyn, N. Y.; Mr. and Mrs. K. M. Simpson, Solvay Sales Corp., Boston, Mass.; Norman Clark, Staten Island, N. Y.

Kalamazoo Valley Section Elects Officers

The Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry held a smoker and business meeting March 7, 1935, at the Community House of the Kalamazoo Vegetable Parchment Company, Parchment, Mich., on Thursday evening, March 7, 1935.

H. M. Annis Elected Chairman

H. M. Annis, Allied Paper Mills, was elected chairman of the local Section for the coming year, succeeding C. C. Schneider of the Hawthorne Paper Co. Other officers elected were: Frank D. Libby, Kalamazoo Vegetable Parchment Co., Vice-chairman; Merle R. Wilkins, Bryant Paper Co., Treasurer; W. F. Hathaway, Kalamazoo Vegetable Parchment Co., Secretary.

Reviews Paper on Sizing

A. C. Dreshfield reviewed the papers on sizing presented at the February Meeting of the Technical Association in New York. H. M. Annis also reviewed some of the papers presented at the February Meeting which dealt with the standardization of testing instruments.

W. J. Lawrence, President of Papermakers Chemical Corporation, who was recently elected a member of the TAPPI Executive Committee, was called upon to speak and, after some reminiscences of the early days of the Association, discussed Association activities.

Refreshments were then served in the Community House dining room and the meeting was concluded by a trip through the KVP Mills.

Among Those Who Attended

Those present were: H. M. Annis, Allied Paper Mills; Severens Balch, Watervliet Paper Company; C. F. Ballinger, Sutherland Paper Company; P. W. Bartholomew, Papermakers Chemical Corporation; John E. Bauman, Kalamazoo Vegetable Parchment Company; Harry C. Bradford, Rex Paper Company; H. E. Brown, New Jersey Zinc Corporation; W. L. Campbell, U. S. Gypsum Company; A. M. Cole, Rex Paper Company; A. C. Dreshfield, Paper Makers Chemical Corporation; H. M. Eastman, Paper Makers Chemical Corporation; Floyd Eggleston, Central Paper Company; Thomas A. Fox, Bryant Paper Company; Harold Heath, Rex Paper Company; H. Colin Hackney, Sutherland Paper Company; W. F. Hathaway, Kalamazoo Vegetable Parchment Company; Walter J. Higbie, Paper Makers Chemical Corporation; Hugo Holz, Central Paper Company; R. H. Hurst, Kalamazoo Vegetable Parchment Company; Glenn Ingling, Kalamazoo Paper Company; W. Kottman, Kalamazoo Vegetable Parchment Company; W. J. Lawrence, Paper Makers Chemical Corporation; Frank D. Libby, Kalamazoo Vegetable Parchment Company; Marvin Loveland, Paper Makers Chemical Corporation; H. R. Miller, Paper Makers Chemical Corporation; Alfred Ohlander, New Jersey Zinc Corporation; A. B. Perlick, Kalamazoo Vegetable Parchment Company; H. G. Potts, Pennsylvania Salt Manufacturing Company; E. A. Radant, Paper Makers Chemical Corporation; John Ruinveld, Rex Paper Company; J. L. Russell, Bryant Paper Company; L. J. Scheid, Watervliet Paper Company; C. C. Schneider, Hawthorne Paper Company; H. C. Smith, Kalamazoo Vegetable Parchment Company; J. D. Stocker, Allied Paper Mills; Karl M. Thorsen, Central Paper Company; I. R. Valentine, Jr., Lee Paper Company; H. O. Ware, Paper Makers Chemical Corporation; Clarence A. White, Bryant Paper Company; W. J. White, Kalamazoo Vegetable Parchment Company; E. F. Whittington, Rex Paper Company; Merle R. Wilkins, Bryant Paper Company; John C. Wood, Kalamazoo Vegetable Parchment Company; F. E. Wotalewicz, Kalamazoo Vegetable Parchment Company.

Bogalusa Joins TAPPI

The Bogalusa Paper Company, Inc., of Bogalusa, La., has become a Corporate Member of the Technical Association of the Pulp and Paper Industry. This Company manufactures 250 tons daily of contained liner and 125 tons of kraft wrapping and bag.

Bogalusa will be represented in the Technical Association by M. E. Cody.

The Optical Characteristics of Paper*

I. The Mathematical Relationships Between Basis Weight, Reflectance, Contrast Ratio, and Other Optical Properties

By F. A. Steele[1]

Abstract

It would be of considerable advantage to be able to calculate the opacity of a sheet of paper differing in basis weight or reflectivity; that is, the reflectance of a completely opaque pile, or both, from another sheet whose optical characteristics are known. The original equations of Kubelka and Munk, which show the relationships between reflectivity, reflectance over a background of known reflectance, and the thickness of thin layers of a diffusing substance, can be used for this purpose. The original derivations of these equations are reproduced.

Since these equations are too cumbersome for routine application, charts are given whereby the calculations are made very simple. From one of these charts the reflectivity can be read directly, if the reflectance over white and over black are known, thus making it possible to determine printing opacity when only a small sample of paper is available.

In general it has been found that these various values when calculated agree with the observed values very nearly within the error of observation.

It is a matter of common knowledge that other things being equal, the lower the reflectivity[2] of a sheet of paper, the higher the opacity. The addition of unbleached sulphite pulp, deinked book or dye increases the opacity of paper, primarily because of the resulting decrease in reflectivity. A sample of paper with a reflectivity of 0.84 and a contrast ratio of 0.76 was found to have a contrast ratio of 0.78 after it had been dyed to a reflectivity of 0.81. A sheet of paper which is blue-white is usually more opaque that a similar sheet which is yellow-white, because the blue-white is obtained by adding blue dye to a pulp which is naturally yellowish. The dye absorbs some of the light, lowers the reflectivity of the sheet, and increases the opacity. As an example of this, a piece of papeterie that was creamy-white had a reflectivity of 0.824 and a contrast ratio of 0.936, while a similar sheet of a slightly blue-white cast had a reflectivity of 0.778 and a contrast ratio of 0.962. If pulp were naturally bluish and the yellow-whites were obtained by adding yellow dye, then the yellow-white papers would generally be less reflective and more opaque than the blue-white.

While these relationships have probably been appreciated in a general way, the increased attention which the optical characteristics of paper have received of late makes it desirable that the relationship between reflectivity and opacity be examined quantitatively. For instance, it would be of value in meeting an opacity specification, if it were possible to predict whether a sheet which was below the desired opacity could be brought up to specification by lowering the reflectivity within permissible limits.

The qualitative relationship between basis weight and opacity is still more obvious, but here again a usable expression of the quantitative relationship between the two factors would be helpful.

There is still a third relationship which is probably not generally recognized as existing at all which may be of considerable value. As will be shown later, the three optical measurements commonly made on paper, reflectance over black, reflectance over white, and reflectivity, bear a definite relationship to each other. Such a relationship, if known, would enable one to calculate any one, if the other two were known. In this way, the reflectivity could be determined, even though a sample large enough to form a completely opaque pile were not available.

It has been found that the interrelationships between all of these various factors can be treated mathematically, and all of the desired calculations made in a very simple manner. It is the purpose of this paper to present the formal mathematical treatment of these relationships and to show how the calculations are accomplished.

Derivation of Fundamental Equations

When light enters a diffusing medium, such as a sheet of paper, a portion of it is reflected or scattered back, a portion of it is absorbed and a portion of it is transmitted, assuming the sheet to be of finite thickness. In dealing with the opacity of paper we are primarily interested in the light reflected back. This is a function of the scattering and absorption characteristics of the paper, together with the thickness of the sheet and the reflecting characteristics of the background. Kubelka and Munk *(1)* have derived certain equations concerning the reflection of light from diffusing media which are useful in this connection. Since their publication may not be generally

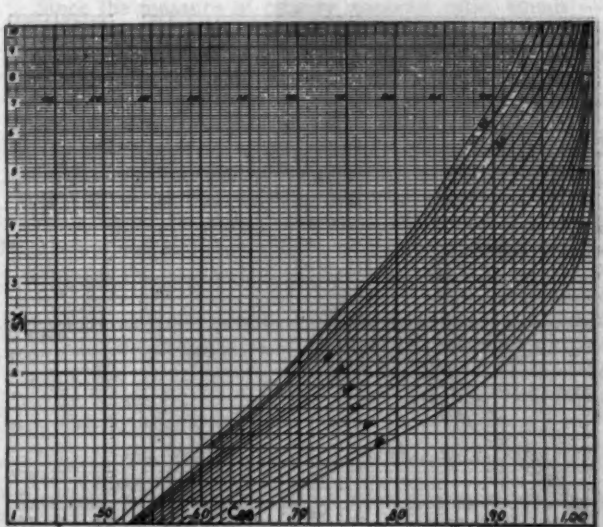


FIG. 1
Equi-reflectivity curves. Contrast ratio, C.R versus RX.

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, N. Y., Feb. 18 to 21, 1935.

[1] Chief of Paper Section, The New Jersey Zinc Company, Palmerton, Pa.

[2] "Reflectivity" seems a convenient term for the reflectance of a pile or layer of paper or other material sufficiently thick to be completely opaque and carries the authority of the Optical Society. This factor is sometimes incorrectly called "brightness."

available, the substance of their derivations will be reproduced here.

In a sheet of a translucent diffusing substance, such as paper, of a finite thickness, X, let us consider an element parallel to the surface of thickness dx and at x distance from the bottom. Let I_0 be the intensity of illumination on the top, i_T the intensity of illumination on the element dx from the top due to transmission and i_R the intensity on the bottom of dx due to reflection from lower layers. Then in passing through dx,

i_T is decreased by i_T (S + K)dx and,
i_R is decreased by i_R (S + K)dx, by definition,
where S is the scattering coefficient and K is the absorption coefficient.
Similarly,
i_T is increased by $Si_R dx$, and
i_R is increased by $Si_T dx$. Then

$$-di_T = -(S + K)i_T dx + Si_R dx, \text{ and}$$
$$di_R = -(S + K)i_R dx + Si_T dx.$$

Dividing by i_T and i_R respectively, and adding,

$$\frac{di_R}{i_R} - \frac{di_T}{i_T} = d\ln\frac{i_R}{i_T} = -2(S + K)dx + S\left(\frac{i_T}{i_R} + \frac{i_R}{i_T}\right)dx.$$

When I = intensity of reflected light, let

$\frac{I}{I_0} = R$. Then

$\frac{i_R}{i_T} = r$, by analogy. Then, since

$$d\ln r = \frac{dr}{r},$$
$$dr = (-2(S + K)r + S + Sr^2)dx;$$
$$\int_{R'}^{R}\frac{dr}{r^2 - \frac{2(S + K)r}{S} + 1} = S\int_0^X dx,$$

which, when integrated between the limits shown gives R, the reflectance of the sheet, in terms of X, the thickness, and R′ the reflectance of the background. Substituting

$$\frac{S+K}{S} = 1 + \frac{K}{S} = a,$$

and integrating between limits,

$$\ln\frac{(R - a - \sqrt{a^2-1})(R' - a + \sqrt{a^2-1})}{(R' - a - \sqrt{a^2-1})(R - a + \sqrt{a^2-1})} = 2SX\sqrt{a^2-1} \quad (I)$$

When $X = \infty$, $R' = R = R_\infty$, and

$$R_\infty = a - \sqrt{a^2-1} \quad (II)$$

giving, finally

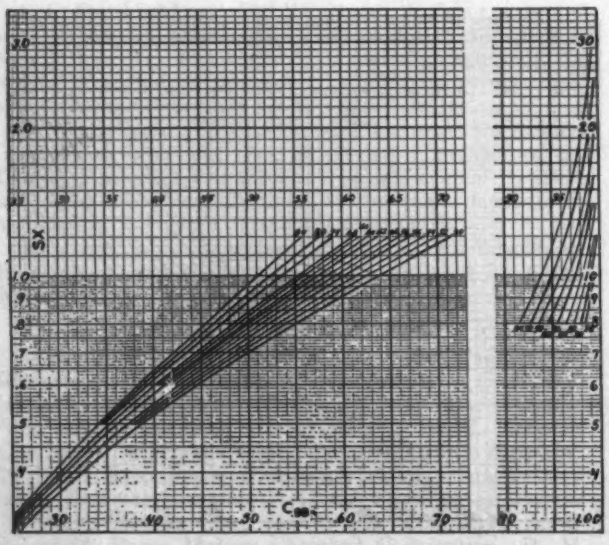


FIG. 2

Fig. 1 extended for light and heavy papers.

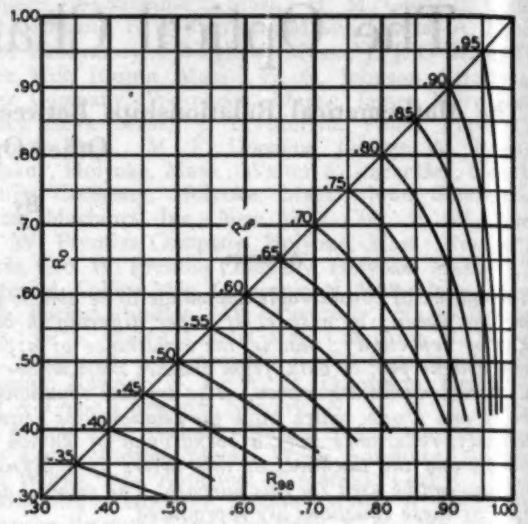


FIG. 3

Equi-reflectivity curves. Reflectance over White, R_∞, versus reflectance over Black, R_0.

$R_\infty = 1 + \frac{K}{S} - \sqrt{\frac{K^2}{S^2} + 2\frac{K}{S}}$, which is the general equation for reflectance at infinite thickness.

For the general equation for reflectance under any condition in terms of reflectance at infinite thickness, (reflectivity) we solve (II) for $\sqrt{a^2-1}$, obtaining

$$\sqrt{a^2-1} = \frac{1}{2}\left(\frac{1}{R_\infty} - R_\infty\right),$$

and substitute in (I). After simplification this gives

$$\frac{\left(R - \frac{1}{R_\infty}\right)\left(R - R_\infty\right)}{\left(R' - \frac{1}{R_\infty}\right)\left(R - R_\infty\right)} = e^{SX\left(\frac{1}{R_\infty} - R_\infty\right)}.$$

Whence

$$R = R_{R'} = \frac{\frac{1}{R_\infty}\left(R' - R_\infty\right) - R_\infty\left(R' - \frac{1}{R_\infty}\right)e^{SX\left(\frac{1}{R_\infty} - R_\infty\right)}}{\left(R' - R_\infty\right) - \left(R' - \frac{1}{R_\infty}\right)e^{SX\left(\frac{1}{R_\infty} - R_\infty\right)}} \quad (III)$$

R being equated to R_R' to make for clarity later, wherein the subscript of R denotes the reflectance of the background. Over a black background, $R^1 = 0$, and

$$R_0 = \frac{e^{SX\left(\frac{1}{R_\infty} - R_\infty\right)} - 1}{\frac{1}{R_\infty}e^{SX\left(\frac{1}{R_\infty} - R_\infty\right)} - R_\infty} \quad (IV)$$

(III) and (IV) are the final equations showing the relationship between R_∞, R_R', and R_0, which are the optical characteristics commonly determined on paper. Since X, the thickness, may be regarded as proportional to the weight per unit area, we could substitute for X the product of a proportionality constant and a variable representing weight per unit area. The constant could then be combined with S, giving a scattering coefficient in terms of weight per unit area rather than thickness. This method is much

more convenient in paper work since weight rather than thickness is the factor commonly determined. Actually, we have retained the original designation, SX, but always regard S as the scattering coefficient related to basis weight and X as the basis weight which is the weight in pounds of 500 sheets, 17 x22 inches. In all subsequent discussion, these terms will be used in this sense.

Application of Fundamental Equations

In using these equations, it is necessary to substitute the known values in one of them and solve for the unknown. In some cases, it is necessary to solve both of them simultaneously. Due to the complexity of the expressions, these direct solutions are entirely impractical for routine work. It is therefore necessary to plot these equations in various ways and accomplish the solutions graphically thereafter. Even the calculation of enough points from these equations to plot a network of curves accurately would involve a great amount of labor. For this reason, they have been transformed by means of hyperbolic functions into expressions which are more rapidly solved. These transformations are made in the following way:

Given equations (III) and (IV), let $R_\infty = e^{-y}$ and SX sinh y = z. Substituting the former in (III),

$$R_{R'} = \frac{e^{y}(R' - e^{-y}) - e^{-y}(R' - e^{y})\, e^{SX(e^{y} - e^{-y})}}{(R' - e^{-y}) - (R' - e^{y})\, e^{SX(e^{y} - e^{-y})}}$$

since $\sinh y = \frac{e^{y} - e^{-y}}{2}$,

$$R_{R'} = \frac{R'\left(e^{(y - SX\sinh y)} - e^{-(y - SX\sinh y)}\right) + \left(e^{(y + SX\sinh y} - e^{-SX\sinh y}\right)}{R'\left(e^{-SX\sinh y} - e^{SX\sinh y}\right) + \left(e^{(y + SX\sinh y)} - e^{-(y + SX\sinh y}\right)}$$

Substituting SX sinh y = z,

$$R_{R'} = \frac{R'\sinh(y - z) + \sinh z}{-R'\sinh z + \sinh(y + z)} \qquad (V)$$

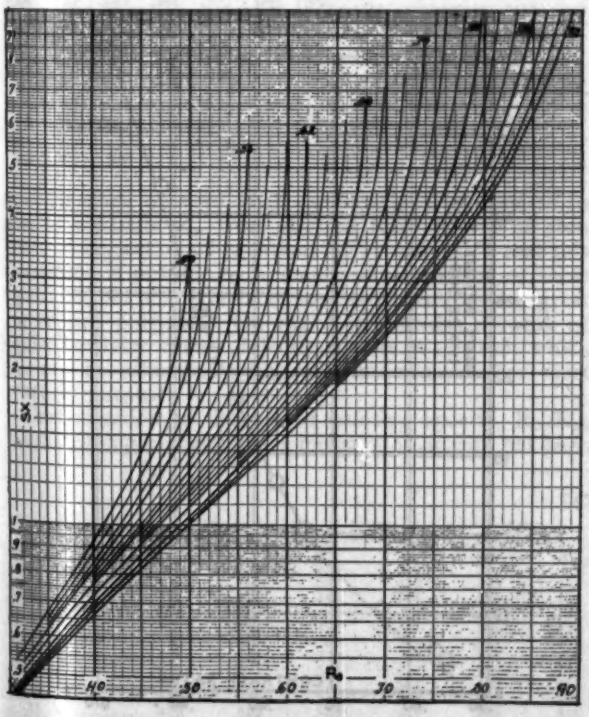


FIG. 4

Equi-reflectivity curves. Reflectance over Black, R_0, versus SX.

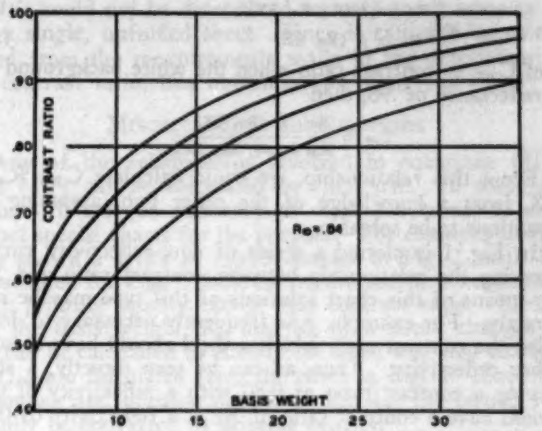


FIG. 5

Curves showing relationship between contrast ratio and basis weight, $R_\infty = .84$.

Parenthetically, we may also write

$$\frac{1}{R'} = \frac{\frac{1}{R_{R'}}\sinh(y - z) + \sinh z}{-\frac{1}{R_{R'}}\sinh z + \sinh(y + z)},$$

which might be useful where the value of R′ was unknown.

Substituting $R_{R'} = e^{-y}$ in (IV),

$$R_0 = \frac{e^{2\,SX\sinh y} - 1}{e^{(y + 2\,SX\sinh y)} - e^{-y}} = \frac{\sinh(SX\sinh y)}{\sinh(y + SX\sinh y)}$$

$$R_0 = \frac{\sinh z}{\sinh(y + z)} \qquad (VI)$$

Since the measure of opacity, contrast ratio, equals $\frac{R_0}{R_R}$, where R′ equals .98, from (V) and (VI) we obtain, after simplification,

$$C.R. = \frac{R_0}{R_\infty} = \frac{-.98\frac{\sinh z}{\sinh(y + z)} + 1}{+.98\frac{\sinh(y - z)}{\sinh z} + 1} \qquad (VII)$$

Using this expression and a good table of hyperbolic functions, the amount of labor involved in calculating the points for the curves is greatly reduced. It is to be understood, however, that these equations should be regarded primarily as tools, useful in solving equations (III) and (IV) for the preparation of charts. The interrelationships among the variables in which we are interested could hardly be visualized from them, nor are they convenient for occasional calculations.

The Use of the Charts in Calculations

Changes in Contrast Ratio with Changes in Basis Weight and Reflectivity

Referring again to equations (III) and (IV), we may write, for the sake of simplicity,

$$R_{R'} = f\,(R', R_\infty, SX) \qquad \text{(III)'},$$

and

$$R_0 = f'\,(R_\infty, SX) \qquad \text{(IV)'}.$$

Let $C_{.98}$ = contrast ratio when the white background has a reflectance of .98, then

$$C_{.98} = \frac{R_0}{R_{.98}} \frac{f'\,(R_\infty, SX)}{f\,(.98, R_\infty, SX)}.$$

From this relationship, we could calculate $C_{.98}$, R_∞ or SX from a knowledge of the other two, assuming the equations to be solvable.

In Fig. 1 is plotted a series of equi-reflectivity curves, showing the relationship between contrast ratio and SX. By means of this chart solutions of this type may be read directly. For example, it is frequently necessary to determine the contrast ratio which a sheet should have at some other reflectivity. Thus, as can be seen directly, a sheet having a contrast ratio of 0.80 with a reflectivity of 0.84 would have a contrast ratio of .81 at a reflectivity of 0.82, the value of SX remaining constant.

The correction of contrast ratio for basis weight is also frequently necessary. Suppose the sheet discussed in the preceding paragraph had a basis weight of 20 pounds and it was desired to know what contrast ratio it would have at a basis weight of 22 pounds and a reflectivity of 0.82. Since, for the same fiber, SX must be proportional to weight, the value of SX for the new sheet will be $\frac{3.00 \times 22}{20} = 3.3$. Referring again to the chart, the contrast ratio of a sheet SX = 3.3 and $R_\infty = 0.82$, is 0.833. So, by means of these curves, it is possible, from the data on one sheet, to calculate the opacity of another sheet of any reflectivity and basis weight but otherwise identical.

Perhaps it should be emphasized at this point that all of these calculations are valid, only if the scattering coefficient, S, of the paper remains constant. The reflectivity may be changed by the addition or removal of dye which changes the absorption coefficient, K, but leaves S constant. On the other hand, if the reflectivity were changed by the use of a different type of fiber, S would probably be changed as well as K, and no calculations made on the assumption that S was constant would be correct.

While calculations of changes in contrast ratio with basis weight are ordinarily performed by the use of Fig. 1 or Fig. 2 as outlined above, in certain cases where a considerable number of such calculations are to be made on papers of essentially the same reflectance, it is convenient

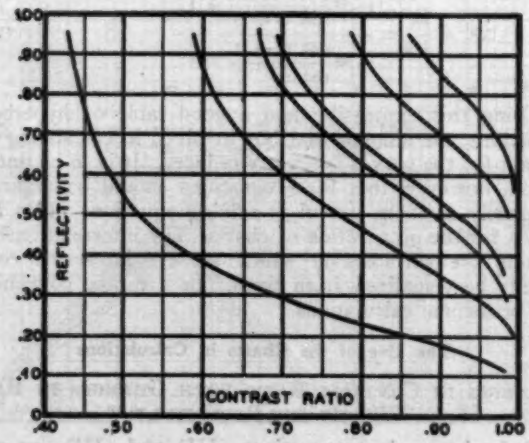


FIG. 6
Curves showing how contrast ratio varies with reflectivity.

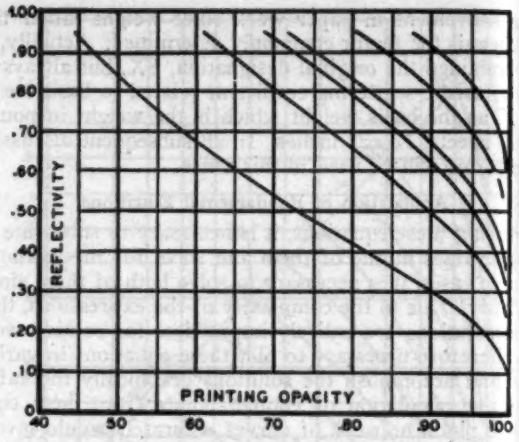


FIG. 7
Curves showing how printing opacity varies with reflectivity.

to draw curves showing contrast ratio against basis weight for various arbitrary values of S. Such a set of curves for $R_\infty = 0.84$ is shown in Fig. 5, the use of which will be self-evident. Similar curves illustrating the relationships between contrast ratio and reflectivity, and printing opacity and reflectivity are shown in Fig. 6 and Fig. 7, respectively.

Calculation of Reflectivity from Reflectance over White and Reflectance over Black

For the determination of R_∞ it is necessary to have a large enough sample to get complete opacity by using a pile of the paper or a single sheet folded over and over. R_0 and $R_{.98}$, however, are determined on a single thickness of paper and so can be measured on a very small sample. Since it not infrequently happens that measurements

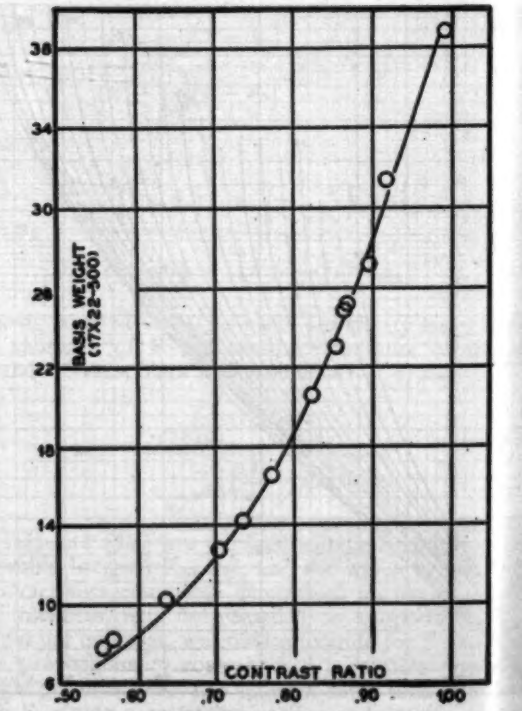


FIG. 8
Contrast ratio versus basis weight, Calculated curve and Experimental points

TABLE I

	Reflectance over Black	Reflectance over White	Reflectivity Observed	Reflectivity Estimated	Error
Onion Skin	.431	.860	.664	.670	+ .006
Mimeograph	.614	.790	.703	.703	0
Glassine	.307	.800	.540	.525	— .015
Coated Book	.718	.772	.742	.743	+ .001
Unwaxed Bread Wrap	.480	.864	.710	.701	— .009
Onion Skin	.658	.896	.795	.802	— .007
Manifold	.364	.902	.706	.683	— .023
Offset	.770	.814	.785	.793	+ .008
Sulphite Bond	.650	.800	.728	.725	— .003
Envelope	.646	.810	.739	.730	— .009
Antique Offset	.812	.886	.853	.858	+ .005
Bible	.684	.930	.847	.850	+ .003
Filter Paper	.744	.952	.912	.905	— .007

TABLE II

CALCULATED VALUES OF C_∞

SX: / R_∞	.3	.4	.5	.6	.7	.8	1.0	1.2	1.4	2.0	3.0
.94	.236	.292	....	....	.421	....	.511	....	.599	.683	.770
.92	....	....	....	....	....	....	....	....	....	.684	.772
.90	....	....	....	....	....	....	....	....	....	....	.778
.88	....	....	....	....	....	....	....	....	.603	.694	.784
.86	....	....	....	....	....	....	....	....	.605	.697	.792
.84	....	....	....	....	.425	....	....	....	.610	.702	....
.82	....	....	....	....	.426	....	.521	....	.613	.708	.810
.80	....	....	.345	....	.428	....	.524	....	....	.717	.820
.78	....	....	.346	....	....	....	.528	....	....	.724	.831
.76	....	....	.347	....	....	....	.531	....	....	.733	.843
.74	....	....	.348	....	.434	....	.535	....	.635	.742	.854
.72	....	....	.350	....	....	....	.541	....	....	.754	.867
.70	....	....	....	.399	....	.480	.546	....	.652	.765	.880
.68	.240	....	.354	....	.444	....	.552	.611	....	.777	....
.66	....	....	.356	.405	....	....	.559	....	.671	.790	.904
.64	....	....	....	.408	....	....	.565	....	.682	.802	.915
.62	.244	.306	....	.412	....	.500	.574	....	.693	.816	....
.60	....	....	....	....	....	....	.583	.649	....	.830	.937
.58	....	....	....	.421	....	.514	.592	.660	.718	.843	.946
.56	.249	.314	....	.426	....	.522	.603	....	....	.858	.955
.54	....	....	.377	.433	....	.531	.615	....	.747	.873	.963
.52	....	....	.381	.438	....	.540	.626	....	.762	.886	.970
.50	.255	.324	.387	....	....	....	.640	....	....	.900	.976

SX: / R_∞	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0	16.0	20.0	30.0
.94	.822	.856	.882	.901	.917	.939	....	.966	....	.984	.994
.92	.828	.863	.891	....	.927	.949	....	.976	....	.990	....
.90	.834	....	.899	....	.937	.959	....	.983	....	.994	....
.88	.842	.882	.910	.931	.947	.968	....	.990	.994	....	....
.86	.852	.892	....	....	.956	.976	....	.993	....	....	....
.84	.862	.903	.931	.950	.965	.982	....	....	....	....	....
.82	.873	.914	.942	.960	.973	.987	.996	....	....	....	....
.80	.885	.925	.952	....	.980	.991	.997	....	....	....	....
.78	.896	.936	....	.976	.985	.994	....	....	....	....	....
.76	.907	....	.969	....	.989	.996	....	....	....	....	....
.74	....	.954	....	....	.992	.997	....	....	....	....	....
.72	.929	.963	.981	....	.995	.998	....	....	....	....	....
.70	.940	.970	.985	....	.997	....	....	....	....	....	....
.68	.949	....	.989	....	.998	....	....	....	....	....	....
.66	.957	.981	....	.998	....	....	....	....	....	....	....
.64	.965	.986	....	.998	....	....	....	....	....	....	....
.62	.972	.989	.996	.999	....	....	....	....	....	....	....
.60	.978	.992	.996	....	....	....	....	....	....	....	....
.58	.982	....	....	....	....	....	....	....	....	....	....
.56	.987	....	....	....	....	....	....	....	....	....	....
.54	.990	.997	....	....	....	....	....	....	....	....	....
.52	.992	....	....	....	....	....	....	....	....	....	....
.50	.995	.999	....	....	....	....	....	....	....	....	....

must be made on very small samples, it is valuable to be able to calculate R_∞ from R_0 and $R_{.98}$. It will be seen from an inspection of equations (III) and (IV) that this calculation is possible by a simultaneous solution of these equations, but again the labor involved is entirely too great for routine purposes. On Fig. 3 is plotted a network of equi-reflectivity curves for R_0 against $R_{.98}$, from which R_∞ can be estimated with sufficient accuracy for most practical purposes.

One objection to the use of printing opacity, R_0/R_∞, instead of contrast ratio as a measure of opacity has been that it could not be determined on very small samples or on a single, unfolded sheet. Since it can now be calculated from the measurements made in the determination of contrast ratio, this objection has been removed.

Miscellaneous Calculations

Any of the relationships involved in equations (III) and (IV) can be calculated by their use. In some instances, it may be necessary or more convenient to construct special charts for the purpose. For example, in Fig. 4 is shown a series of curves similar to Fig. 1, with R_0 substituted for $C_{.98}$. These curves are useful when dealing with printing opacity rather than contrast ratio. Knowing the basis weight, R_∞ and R_0 of a sheet, changes in R_0 can be calculated in exactly the same way that changes in $C_{.98}$ are calculated from the chart in Fig. 1. Since R_∞ is known and printing opacity is R_0/R_∞, the results can readily be converted to printing opacity.

Experimental Confirmation of the Theory

It is not the primary purpose of this paper to show the correlation between the practical and theoretical optics of paper. A few illustrations will be given, however, which will show that the theory, in most cases, predicts the facts within the experimental error of determining the facts.

The curve in Fig. 8 illustrates the agreement between experimental and observed values for contrast ratio as a function of basis weight for a series of carefully prepared hand sheets. There is a measurable deviation on the very light sheets, but the agreement is so good elsewhere that it may be partly coincidence. The heaviest sheet, for example, agrees more closely than a sheet so heavy can be made according to specification. In other words, two such sheets intended as duplicates would probably agree less closely than this sheet and the curve.

To test the accuracy of the calculation of contrast ratio with changes in reflectivity, a series of hand sheets were made with various amounts of dye. From the reflectivity, basis weight, and contrast ratio of the first sheet and the reflectivity and basis weights of the others, the contrast ratios were calculated. The results were as follows:

Sheet No.	cc. Dye	Basis Weight 17x22—500	R_∞	C_∞ Observed	C_∞ Calculated
1	0	19.04	.867	.759	....
2	1/2	18.74	.837	.769	.767
3	1	18.66	.813	.775	.774
4	2	19.06	.782	.796	.794

If these sheets were to be remeasured, the agreement with the first values would be no better than the calculated ones.

In order to test the accuracy of estimating R_∞ from $R_{.98}$ and R_0 from Fig. 3, a series of commercial papers selected at random were investigated with the results shown in Table I. In this series, there were only two samples in which the discrepancies were .01 or over, and both of these samples fell below the range of the calculated curves so that questionable extrapolations had to be made.

TABLE III

SX: / R_∞	.738 R_0	.738 R	1.359 R_0	1.359 R	1.913 R_0	1.913 R	2.142 R_0	2.142 R	3.045 R_0	3.045 R	3.29 R_0	3.29 R	5.10 R_0	5.10 R
.35	.301	.483	.339	.383	....	....	....	....	....	....	....	....	....	....
.40	.326	.557	.381	.445	.392	.414	....	....	....	....	....	....	....	....
.45	.348	.633	.416	.514	.438	.475	.444	.464	.449	.454	....	....	....	....
.50	.364	.704	.450	.587	.478	.539	.485	.528	.496	.507	.498	.505	....	....
.55	.380	.762	.477	.657	.515	.605	.527	.592	.542	.563	....	....	.549	.553
.60	.392	.814	.502	.723	.547	.672	.560	.637	.585	.622	.589	.617	....	....
.65	.403	.860	.522	.783	.576	.737	.592	.722	.626	.684	.629	.679	.646	.656
.70	.409	.895	.538	.837	.599	.796	.616	.784	.659	.746	.666	.740	.691	.711
.75	.414	.923	.551	.883	.618	.853	.636	.843	.690	.814	.698	.801	.733	.769
.80	.419	.946	.561	.919	.633	.900	.655	.891	.713	.865	.724	.860	.769	.828
.85	.422	.962	.569	.947	.644	.936	.672	.932	.733	.917	.743	.911	.799	.886
.90	.424	.972	.573	.966	.651	.964	.676	.959	.743	.951	.757	.949	.820	.936
.95	.422	.979	.577	.980	.654	.975	.681	.976	.753	.973	.765	.975	.833	.970

TABLE IV
CALCULATED VALUES OF SX

	R∞	0	.10	.20	.30	.40	.50	.60	.70	.80	.85	.90	.92	.....
R₀	.92	0	.10	.20	.30	.40	.50	.60	.70	.80	.85	.90	.92	.....
SX		0	.110	.250	.429	.668	1.00	1.51	.237	4.24	6.315	†2.40	∞	.....
R₀	.90	.84	.878	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		6.15	10.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.88	.83	.864	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		6.1	10.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.86	0	.10	.20	.30	.40	.50	.60	.70	.80	.82	.84	.851	.86
SX		0	.110	.250	.431	.673	1.02	1.55	2.52	4.96	6.07	8.12	10.00	∞
R₀	.84	.77	.81	.830	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		4.14	6.26	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.82	.73	.79	.814	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		3.24	5.67	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.80	0	.10	.20	.30	.40	.50	.60	.70	.74	.78	.80	.....	.....
SX		0	.110	.252	.434	.683	1.04	1.63	2.80	3.76	6.02	∞	.....	.....
R₀	.78	.74	.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		4.23	6.86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.76	.69	2.94	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		.725	4.08	6.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.74	0	.10	.20	.30	.40	.50	.60	.66	.70	.722	.735	.74	.....
SX		0	.111	.253	.438	.697	1.08	1.76	2.53	3.55	5.00	6.88	∞	.....
R₀	.72	.61	.66	.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		1.95	2.75	5.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.70	.64	.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		2.55	4.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.68	0	.10	.20	.30	.40	.50	.60	.64	.66	.68	.....	.....	.....
SX		0	.112	.254	.447	.725	1.155	2.03	2.84	3.67	∞	.....	.....	.....
R₀	.66	.59	.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		2.05	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.64	.59	.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		2.24	3.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.62	0	.10	.20	.30	.40	.50	.55	.58	.60	.614	.62	.....	.....
SX		0	.113	.255	.460	.762	1.29	1.76	2.27	2.92	4.00	∞	.....	.....
R₀	.60	.54	.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		1.79	3.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.58	.52	.57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		1.67	3.29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.56	0	.10	.20	.30	.40	.50	.52	.54	.555	.56	.....	.....	.....
SX		0	.114	.262	.480	.821	1.57	1.88	2.48	4.1	∞	.....	.....	.....
R₀	.54	.41	.48	.53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		.894	1.45	2.79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.52	.41	.47	.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SX		.938	1.48	2.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R₀	.50	0	.10	.15	.20	.30	.35	.40	.45	.47	.49	.50	.....	.....
SX		0	.114	.187	.270	.502	.674	.924	1.37	1.70	2.42	∞	.....	.....

TABLE V

VALUES OF y AND sinh y FROM THE EQUATION R∞ EQUALS e^{-y}

R∞	y	sinh y	R∞	y	sinh y	R∞	y	sinh y	R∞	y	sinh y
.20	1.609	2.398	.43	.844	.947	.66	.4155	.4275	.89	.117	.117
.21	1.561	2.277	.44	.821	.916	.67	.401	.412	.90	.1054	.1056
.22	1.514	2.164	.45	.798	.886	.68	.3857	.3953	.91	.094	.094
.23	1.470	2.060	.46	.777	.857	.69	.371	.380	.92	.0834	.0835
.24	1.427	1.963	.47	.755	.829	.70	.3567	.3643	.93	.072	.072
.25	1.386	1.875	.48	.734	.802	.71	.342	.349	.94	.0619	.0619
.26	1.347	1.793	.49	.713	.775	.72	.3285	.3345	.95	.052	.052
.27	1.309	1.716	.50	.693	.750	.73	.315	.320	.96	.0408	.0408
.28	1.273	1.646	.51	.674	.725	.74	.3011	.3046	.97	.031	.031
.29	1.238	1.579	.52	.654	.701	.75	.287	.291	.98	.0202	.0202
.30	1.204	1.518	.53	.635	.679	.76	.2745	.2779	.99	.010	.010
.31	1.171	1.458	.54	.616	.657	.77	.262	.265	...	.....	.....
.32	1.139	1.403	.55	.598	.636	.78	.2485	.2510	...	.....	.....
.33	1.109	1.350	.56	.5798	.6129	.79	.236	.238	...	.....	.....
.34	1.079	1.300	.57	.562	.592	.80	.2232	.2251	...	.....	.....
.35	1.050	1.254	.58	.5447	.5721	.81	.211	.213	...	.....	.....
.36	1.022	1.209	.59	.528	.551	.82	.1985	.1998	...	.....	.....
.37	.994	1.167	.60	.5108	.5333	.83	.187	.187	...	.....	.....
.38	.968	1.126	.61	.494	.514	.84	.1743	.1752	...	.....	.....
.39	.942	1.087	.62	.4781	.4964	.85	.161	.163	...	.....	.....
.40	.916	1.050	.63	.462	.478	.86	.1508	.1514	...	.....	.....
.41	.892	1.014	.64	.4463	.4612	.87	.139	.139	...	.....	.....
.42	.868	.981	.65	.431	.44	.88	.1278	.1281	...	.....	.....

Tables of Data Used for Constructing Charts

Since the charts as reproduced in this paper are probably too small to be used with precision, some investigators may wish to construct them for themselves on a larger scale.[3] They can do so from the calculated data in the tables:

Table II corresponds to Fig. 1 and Fig. 2.
Table III corresponds to Fig. 3.
Table IV corresponds to Fig. 4.
Table V gives the values for y and sinh y for various values of R∞ from the equation, $y = ln \frac{1}{R_\infty}$, ($R_\infty = e^{-y}$). These values are used in calculations involving equations (V), (VI), and (VII).

Acknowledgment

The author wishes to acknowledge the valuable assistance of Professor Joseph B. Reynolds of Lehigh University, who made the hyperbolic transformations of equations (III) and (IV) and calculated some of the data given in Table V.

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[3] The author has a number of copies of these charts of convenient size on hand which he will be glad to furnish for the asking.

Our Present Knowledge of Rosin*

By E. A. Georgi[1]

Abstract

A review of the history of rosin and naval stores manufacture, properties of and tests for rosins and a consideration of the composition of rosin and the nature of some of its salts.

Although the use of naval stores is recorded as early as 500 B. C., the American industry did not begin until 1600. This early industry concerned itself mainly with the manufacture of tar, pitch, and turpentine.

From 1700 to 1900 the methods used to produce naval stores changed but little. The process consisted of slashing the pine tree and collecting the gum-dip or oleoresin. Nothing was known at this time of different methods of slashing or the effect of different types of cuts. It remained for the Department of Agriculture and Miss Eloise Gerry *(20)* of the Forest Products Laboratory to show the effect of different methods of collecting gum-dip. To manufacture rosin from the oleoresin the turpentine was distilled from it in a copper retort while a small stream of water was added; the rosin remained in the retort. Some rosin was made by dry distillation of the gum-dip, but since this rosin was of poor grade the method soon disappeared. Also during this early period the rosin was

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, N. Y., Feb. 18 to 21, 1935.
[1] Naval Stores Department, Hercules Powder Company, Wilmington, Del.

run off into nearby brooks and ponds since there was no market for the rosin. During the period 1900 to 1920, much of this rosin was "mined."

In the past, the gum rosin industry has been handicapped by a lack of technical control. Research is showing that by adequate control a standard uniform grade of rosin can be produced. The more modern and progressive producers of the present day have effected minor improvements in that they now classify the collections of oleoresins. This is important since the earliest collections of gum-dip (in a season) always produce the lightest grade of rosin. A few producers recognizing the fact that temperature plays an important part in the proper plant production of naval stores have introduced thermometric control. Recently a movement has been started among gum-dip producers for the centralized refining and processing of oleoresin collected over a wide area.

In 1909 when it was thought that a shortage of virgin pine forests threatened, H. T. Yaryan disclosed the so-called steam and solvent process which produces naval stores from waste pine wood. This was the beginning of the wood Naval stores industry. Stumps and top wood are collected, the wood hogged and shredded and then steamed for turpentine. After this it is extracted with gasoline and the solution distilled. Pine oil and rosin are recovered.

Present day rosins are best studied by comparing their properties and the tests used to measure these properties.

In considering the properties of rosin, there are two which immediately strike the prospective user. These are color and cleanliness. Gum rosins, because of their method of production, generally contain more dirt than do wood rosins. However, gum rosins vary greatly in their dirt content, foreign rosins being no better in this respect *(1)*. The color of rosin is an all-important property since this property, in conjunction with cleanliness, forms the basis of the selling price. At the present time color is usually measured in one of two ways. A cube of rosin may be compared to a government standard type, or the rosin is poured into a mold and the color measured with the aid of Lovibond color glasses. Of the two methods, the second is to be preferred but is a long way from being perfect. Recently Brice, of the U. S. Department of Agriculture, has published several papers *(2)* regarding the development of a photoelectric colorimeter and also a proposed modification of the present government color standards which would call for a more uniform change between grades. Such a photoelectric colorimeter should eliminate a lot of the trouble encountered in measuring the color of rosin.

The next properties to consider are melting point and viscosity. These two characteristics are really one property as has been shown by Nash *(3)*. The melting point as determined by the ring and ball or drop test is really a measurement of the temperature at which a certain viscosity is attained. Viscosity is probably of some importance in the preparation of cooked size.

Other properties of lesser importance, such as vapor pressure, specific heat, latent heat, and density have been measured for wood rosins by Peterson *(4)*. Practically all properties of rosin are affected to some extent by heat, but this heat effect is of practically no importance up to temperature of 150 deg. C. For example if molten rosin is held at 250 deg. C. for a certain length of time, the density will increase. In other words these changes take place with increasing rapidity as the temperature is raised. These changes may be due to three causes: loss of volatile constituents, internal chemical reaction (formation of condensation products), and isomerization of the acid constituents. La Land *(19)* has shown that decomposition of the molecule (i. e. decarboxylation and dehydration) do not take place much under 200 deg. C. and only extremely slowly up to nearly 300 deg. C.

Two other very important properties are the acid and saponification numbers. These properties give us an insight as to the relative proportions of acids, esters, and resenes present in rosin. Naturally they vary from grade to grade, but on the whole rosin can be said to be composed of approximately 85 per cent acids, 5 of esters, and 10 of resenes. The amount of esters is calculated from the difference in acid and saponification numbers. Any errors in these determinations will most probably be in the determination of saponification number, since certain esters of the rosin acids are very difficultly saponified. Recently we have developed a new method of saponification, which consists of using sodium methylate as a saponifying agent, the reaction being carried out in a neutral solvent. The exact method will be published in the near future.

At the present time no methods exist for determining the character and number of acids and esters present in the rosin. Likewise no methods exist which will tell us the nature of the resenes. It is known, of course, that they are unsaponifiable and that in certain rosins at least the major portion are higher hydrocarbons of the paraffin type *(5)*.

Other tests sometimes included in rosin analyses are the gasoline and petroleum ether insoluble, and the unsaponifiable determination. These figures are difficult to obtain because of the great sensitiveness of the methods to external conditions. In general the insoluble figures are a measure of the oxidized and unsaponifiable components present, while the unsaponifiable material should closely check the amount of resenes.

Crystallization is also a property of rosin. The crystallization of rosins is the result of a combination of many factors which we will not be able to discuss at this time, however it should be mentioned that crystallization in no way changes the chemical properties of rosin. Naturally the temperature at which a complete solution or liquid rosin is obtained is somewhat raised. We know that the tendency to crystallize becomes greater as the acid number in the rosin increases. The tendency to crystallize also increases with temperature, maximum crystallization being expected in the neighborhood of 90 to 120 deg. C. depending on the type of rosin. A high negative rotation of the rosin indicates a greater tendency to crystallize, but cannot be relied upon as a measure of the tendency to crystallize because the rotation determined is always a composite of the rotations of the various constituents present. The optical rotation incidentally is a property which must be determined in the same manner at all times since not only the solvent but the concentration in the solvent affect the specific rotation obtained *(6)*.

Considering the composition of rosin, we can say that the resenes have been studied least of all. As mentioned before, we know they consist of hydrocarbons, such as n-heptacosane (*7*), and other waxy bodies. The esters present constitute only a small proportion of the total rosin and can be considered relatively unimportant. Research on the composition of rosin has in the past centered around the isolation and purification of the various rosin acids. Much work has been done by Dupont and his co-workers (*8*). At the same time considerable chemical work relating to the structure of these rosin acids has been done by Ruzicka and his co-workers (*9*). The net result of these researches on the rosin acids has been the isolation of a number of materials called rosin acids. At the present time the literature names some forty odd crystalline rosin acids, not to mention references to non-crystalline acids. Many of the investigators assumed maximum purity had been obtained

because the melting point and optical rotation no longer changed on recrystallization. This fact alone does not assure maximum purity, particularly not isomeric purity. Of all the rosin acids claimed to have been isolated more work has been done on abietic acid than on any others. Abietic acid probably does not occur in the oleoresin as such, but is the result of an isomerization process. This isomerization begins with what are termed primary acids such as l- and d-pimaric. Heat or acid causes the isomerization of these primary acids (except d-pimaric) to secondary acids and these secondary acids are in turn isomerized to abietic. Abietic acid, however, must not be considered the final isomerization product since it can be isomerized at temperatures of 200 to 300 deg. C. to pyroabietic acids. According to Dupont (*10*), the isomerization proceeds somewhat as follows:

Primary acids ⟶ Secondary acids ⟶ Abietic acid ⟶ Pyroabietic acids

It remained for Köhler (*11*) to present the first classification of the rosin acids.

It is generally conceded that the isomerization process is caused by a shifting of the position of the double bonds in the rosin acid molecule from a position of higher to one of lower free energy (*12*). Abietic acid has been shown to be 1, 12-dimethyl-7-isopropyl decahydrophenantherene carboxylic acid. At least one other rosin acid, namely d-pimaric has been shown by Ruzicka to have a different carbon skeleton, which accounts for its relative stability toward isomerization agents. The ratio of these different rosin acids to one another in any given grade of rosin will vary considerably because of the great number of factors affecting the isomerization as described above.

We have spoken briefly of the great number of rosin acids supposedly isolated. The actual number of rosin acids existing is undoutedly much smaller. Nevertheless, several such as 1- and d-pimaric and abietic have been isolated recently by Palkin (*13*) (*15*) with sufficient purity to enable us to compare their properties. We know for example that the rotations and melting points differ widely. We know too that the solubility in organic solvents is different. It is to be regretted that so much work has been done on abietic acid and that the other acids have suffered from a comparative lack of research.

Of most importance to the paper maker is the fact that the salts of rosin acids, particularly the sodium salts, are also quite different. As an example let us consider abietic acid and its sodium salts. Abietic acid is the only rosin acid that we know of at present which forms a double salt that can be isolated and crystallized. This double salt was first isolated by Dupont (*14*). Because of the changes in rotation produced by the recrystallization of this salt, it has been postulated that other acids likewise form a double salt but so far none have been isolated (*15*). The double salt of abietic acid, or 3:1 salt as it is sometimes called, is extremely important in the chemistry of rosin size. Since it is composed of one molecule of sodium abietate and three molecules of abietic acid we at once say that it can be formed in any size containing free rosin. A glance at its properties in the accompanying table shows that it is certainly insoluble in practically all solvents, including water. This means that once formed it is likely to precipitate out in the form of tiny crystals. Its presence can be expected in any size containing appreciable quantities of free rosin and particularly in those made from rosins high in abietic acid content. Acid salts such as this are not uncommon; an acid laurate is described by McBain (*16*) who shows that it precipitates over a wide range of concentration. The neutral salt on the other hand is soluble in water to the extent that it will form a rigid gel, but can be recrystallized from alcohol. At least one other salt, sodium

TABLE I

	Abietic Acid	3 : 1	Sodium Abietate
Molecular Weight	302	1230	324
Acid No.	185.6	136.7*	0
Sapon. No.	185.6	136.7*	0
Melting Point	170°–175° C.	200°–210°C.	above 360° C.
Sp. Rot [α]D 2 per cent alcohol	—100°	—95°	—85°
Ash (Na_2CO_3)	0	4.32%	16.35%
Solubility:			
Alcohol—75 deg. C.	...	12%	16%
Alcohol—20 deg. C.	13%	5%	6%
Absolute Alcohol	16%	...	5%
Water	I	I	S
Acetone	S	St	I
Benzene	S	I	I
Petroleum Ether	S	I	I
Ethyl Ether	S	I†	I‖
pH Aqueous Solution	....	...	8.5–9.0

* It should be mentioned there is a possibility that certain rosin acids will form acid salts of a different ratio, i.e., 1 : 1. If so the acid number would be changed accordingly.

† Aqueous ether will split the 3 : 1 salt, the neutral portion going to the aqueous layer and the acid portion going to the ethereal layer.

‡ Less than 1 per cent.

‖ Extracts may be obtained because of hydrolysis of the salt.

d-pimarate, is so relatively insoluble in water that it can be recrystallized (*17*). This shows that a considerable difference exists among the sodium salts of different rosin acids. In rosin size therefore we are not dealing with a particular sodium salt, but a mixture depending upon the nature and composition of the original rosin used. In sizing of paper these sodium salts are converted to a complex aluminum salt, the nature of which is yet a mystery. However it is reasonable to expect that different rosin acids will form aluminum salts having as widely different properties as the sodium salts. This may account for some of the conflicting results obtained in sizing work.

One other point remains to be considered and that is the subject of atmospheric oxidation. Oxidation is not uniform for different rosins and has been shown to be an auto catalytic reaction (*18*). It has also been shown that certain metals and ultra-violet light catalyse the reaction which centers around the double bonds. Here again the position of the double bonds in the molecule will produce different susceptibilities to oxidation and hence various rosins oxidize with varying rates. Oils tend to increase the rate of oxidation, probably because they form better catalysts for the reaction. Oxidation is particularly annoying since the decomposition of the oxidized molecule and the subsequent development of color begins to take place in the neighborhood of 125 deg. C. and hence the trouble may not be detected until the rosin reaches a point in process where this temperature is attained. Here again the reaction is accelerated by elevated temperatures. Of course, some discoloration may be noticed in powdered rosin held at room temperature, but those color changes are probably brought on by photochemical decomposition. It is believed that saturating the double bonds will produce a non-oxidizing rosin as well as improving certain other qualities.

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IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING MARCH 16, 1935

CIGARETTE PAPER

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WALL PAPER

R. F. Downing & Co., Wales, Maru Kobe, 14 bls.; ———, Mercier, Antwerp, 4 pkgs.

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W. H. S. Lloyd & Co., Amer. Farmer, London, 10 bls., 1 cs.; W. H. S. Lloyd & Co., Olympic, Southampton, 2 cs., 1 ble.

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Perkins Goodwin & Co., Deutschland, Hamburg, 80 rolls; Jay Madden Corp., Deutschland, Bremen, 490 rolls; Jay Madden Corp., Rydboholm, Hango, 315 rolls; Jay Madden Corp., Hamburg, Bremen, 163 rolls; Perkins Goodwin & Co., Hamburg, Hamburg, 383 rolls.

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A. W. Fenton, Inc., Deutschland, Bremen, 100 bls.; H. Reeve Angel & Co. Inc., Amer. Farmer, London, 10 cs.; H. Reeve Angel & Co. Inc., Olympic, Southampton, 16 cs., 5 bls.; C. Schleicher & Schull Co., Inc., Hamburg, Hamburg, 9 cs., 1 ble.

DRAWING PAPER

Titan Shipping Co., Deutschland, Bremen, 5 cs.; H. Reeve Angel & Co. Inc., Amer. Farmer, London, 2 cs.

TRACING PAPER

Titan Shipping Co., Deutschland, Bremen, 4 cs.

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Chas. Happel, Deutschland, Hamburg, 7 cs.

SURFACE COATED PAPER

P. Puttman, Pennland, Antwerp, 5 cs.; Gevaert Co. of America, Pennland, Antwerp, 36 cs.; ———, Hamburg, Hamburg, 2 cs.

BARYTA COATED PAPER

L. A. Consmiller, Hamburg, Bremen, 16 cs.

METAL COATED PAPER

K. Pauli Co., Hamburg, Bremen, 38 cs.; K. Pauli Co., Hamburg, Hamburg, 5 cs.

BASIC PAPER

Globe Shipping Co., Hamburg, Bremen, 14 cs., 5 crates.

PHOTO PAPER

Medo Photo-Supply Co., Olympic, Southampton, 1 cs.

TISSUE PAPER

Jay Madden Corp., Deutschland, Hamburg, 20 bbls.; ——— Deutschland, Hamburg, 1 cs.; B. F. Drakenfeld & Co., Scythia, Liverpool, 5 cs.; Van Oppen & Co., Pr. Hayes, Marseilles, 6 cs.

DECALCOMANIAS

L. A. Consmiller, Deutschland, Hamburg, 5 cs.; L. A. Consmiller, Hamburg, Hamburg, 6 cs.; Sellers Transportation Co., Hamburg, Hamburg, 5 cs.; Sellers Transportation Co., Hamburg, Bremen, 11 cs.

PARCHMENT PAPER

Vulcan Yeast Co., Deutschland, Hamburg, 1 cs.; ———, Hamburg, Bremen, 8 cs.

IVORY BOARD

R. Wilson Paper Corp., Blommersdyk, Rotterdam, 20 cs.

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International F'd'g Co., Deutschland, Hamburg, 6 cs.; R. E. Thibaut Inc., Black Heron, Antwerp, 10 cs.

GUMMED PAPER

G. Gennert, Hamburg, Hamburg, 2 cs.; ———, Deutschland, Bremen, 2 cs.

LITHO PAPER

General Printing Ink Co., Nagara Maru, Canton, 25 cs.; National City Bank, Nagara Maru, Canton, 15 cs.

WRITING PAPER

Japan Paper Co., Amer. Farmer, London, 1 cs.; Japan Paper Co., Conti di Savoi, Genoa, 3 cs.; Globe Shipping Co., Champlain, Havre, 2 cs.

STENCIL PAPER

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———, Hamburg, Bremen, 35 cs.

MISCELLANEOUS PAPER

Standard Products Corp., Wales Maru, Yokohama, 7 cs.; Steffens Jones Co., Nagara Maru, Kobe, 2 cs.; T. N. Fairbanks, Nagara Maru, Yokohama, 5 cs.; Lunham &

Reeve, Inc., Rydboholm, Gothenburg, 94 rolls; ———, Olympic, Southampton, 4 cs.; W. Barsch, Hamburg, Hamburg, 1 cs.

RAGS, BAGGING, ETC.

Leigh Textile Co., Blommersdyk, Rotterdam, 103 bls. cotton waste; ———, Amer. Farmer, London, 77 bls. rags; Chase National Bank, Transylvania, Glasgow, 73 bls. paper stock; Irving Trust Co., Transylvania, Glasgow, 49 bls. bagging; Royal Manfg. Co., Amer. Importer, Manchester, 50 bls. cotton waste; Castle & Overton, Inc., Argentino, B, Ayres, 285 bls. rags; Castle & Overton, Inc., Pipestone County, Havre, 104 bls. bagging; Loumar Textile By-Products, Inc., Pipestone County, Havre, 77 bls. bagging; E. J. Keller Co. Inc., Pipestone County, ———, 56 bls. rags; S. Birkenstein & Sons, Tonsbergfjord, Barcelona, 337 bls. rags; Chase National Bank, Tonsbergfjord, Barcelona, 187 bls. jute waste; Royal Manfg. Co., Black Heron, Antwerp, 63 bls. cotton waste; Atlas Waste Manfg. Co., Edam, Rotterdam, 26 bls. rags; Bank of N. Y. Trust Co., Artigas, Belfast, 93 bls. paper stock; Manufacturers Trust Co., Hamburg, Hamburg, 100 bls. cotton waste; E. J. Keller Co. Inc., Troubadour ———, 274 bls. paper stock E. J. Keller Co. Inc., Troubadour, ———, 74 bls. bagging; E. J. Keller Co. Inc., Excalibur, ———, 142 bls. rags; E. J. Keller Co. Inc., Pr. Hayes, ———, 78 bls. bagging; E. J. Keller Co. Inc., Pr. Hayes, ———, 41 bls. paper stock.

HIDE GLUE

———, Deutschland, Bremen, 25 bags.

OLD ROPE

Banco Coml. Italiane Trust Co., Amer. Farmer, London, 60 coils.

CASEIN

———, Southern Cross, B. Ayres, 84 bags.

WOOD PULP

Castle & Overton, Inc., Deutschland, Hamburg, 950 bls. wood pulp, 190 tons; Bank of N. Y. Trust Co., Deutschland, Hamburg, 1190 bls. wood pulp, 238 tons; ———, Deutschland, Hamburg, 500 bls. chemical pulp, 100 tons; M. Sone, Deutschland, Bremen, 254 bls. wood pulp; Pagel Horton & Co. Inc., Rydboholm, Gothenburg, 250 bls. sulphite; Perkins Goodwin & Co., Rydboholm, Gothenburg, 1016 bls. sulphate; Lagerloef Trading Co., Rydboholm, Hango, 390 bls. mechanical; Lagerloef Trading Co., Rydboholm, Hango, 2032 bls. sulphite; Castle & Overton, Inc., Hamburg, Hamburg, 590 bls. wood pulp, 118 tons; Bank of N. Y. Trust Co., Hamburg, Hamburg, 780 bls. wood pulp, 136 tons; ———, Hamburg, Hamburg, 500 bls. wood pulp, 101 tons; E. J. Keller Co. Inc., Pr. Roosevelt, ———, 322 bls. wood pulp, 49 tons.

WOOD PULP BOARDS

Johaneson Wales & Sparre, Inc., Rydboholm, Hango, 192 rolls.

BOSTON IMPORTS

WEEK ENDING MARCH 16, 1935

———, Pipestone County, Havre, 200 bls. bagging; ———, Scythia, Liverpool, 612 bags hide cuttings; G. F. Malcolm Inc., Scythia, Liverpool, 11 cs. tissue paper; Bulkley Dunton & Co., Britte Marie, ———, 9150 bls. wood pulp; E. J. Keller Co. Inc., Carplaka, ———, 337 bls. paper stock.

PHILADELPHIA IMPORTS

WEEK ENDING MARCH 16, 1935

Castle & Overton, Inc., Argentino, B. Ayres, 120 bls. rags; Loumar Textile By-Products Co., Pipestone County, Dunkirk, 142 bls. rags; Castle & Overton, Inc., Pipestone County, Havre, 291 bls. rags; E. J. Keller Co. Inc., Pipestone County, ———, 80 bls. rags; M. Sone, Hjelmaren, Gothenburg, 1485 bls. wood pulp.

BALTIMORE IMPORTS

WEEK ENDING MARCH 16, 1935

Price & Pierce, Ltd., Milos, Wallvik, 1200 bls. sulphite, 200 tons; Price & Pierce, Ltd., Milos, Wallvik, 1350 bls. sulphate, 225 tons; Brown Bros. Harriman & Co., Milos, Kopmanholmen, 5352 bls. chemical, 889 tons; Perkins Goodwin & Co., Milos, Sundsvall, 5400 bls. sulphate, 900 tons; Stora Kopparberg Corp., Milos, Gefle, 140 bls. wood pulp, 28 tons; Stora Kopparberg Corp., Milos, Gefle, 499 rolls news print; Congoleum Nairn Co., Liberty, Havre, 556 bls. rags; S. Shapira & sons, Liberty, Havre, 6 bls. rags; Castle & Overton, Inc., Beemsterdyk, Rotterdam, 324 bls. wood pulp; W. Allison, Beemsterdyk, Rotterdam, 72 bls. paper stock; ———, Nagara Maru Kobe, 290 bls. rags; Perkins Goodwin & Co., Rydboholm, Gothengurg, 1270 bls. sulphite; Perkins Goodwin & Co., Rydboholm, 631 bls. sulphate; Perkins Goodwin & Co., Rydboholm, Gothenburg, 762 bls. kraft pulp; Stora Kopparberg Corp., Rydboholm, Gothenburg, 470 rolls newsprint; The Borregaard Co. Inc., Rydboholm, Gothenburg, 500 bls. chemical pulp; Lagerloef Trading Co., Rydboholm, Hango, 130 bls. mechanical pulp; Lagerloef Trading Co., Rydboholm, Hango, 2990 bls. sulphite; Castle & Overton, Inc., Rydboholm, Hango, 3358 bls. sulphite.

NORFOLK IMPORTS

WEEK ENDING MARCH 16, 1935

Darmstadt Scott & Courtney, Black Heron, Antwerp, 74 bls. flax waste.

NEWPORT NEWS IMPORTS

WEEK ENDING MARCH 16, 1935

Stora, Kopparberg Corp., Milos, Gefle, 530 bls. wood pulp, 107 tons; Bulkley Dunton & Co., Milos, ———, 250 bls. sulphite, 50 tons; Pagel Horton & Co., Inc., Milos, Domsjo, 2500 bls. sulphite, 440 tons; Price & Pierce, Ltd., Milos, Wallvik, 2400 bls. sulphite, 400 tons; Price & Pierce, Ltd., Milos, Wallvik, 1700 bls. sulphate, 200 tons; Bulkley Dunton & Co., Tennessee, ———, 600 bls. wood pulp.

JACKSONVILLE IMPORTS

WEEK ENDING MARCH 16, 1935

Virginia Paper Co., Rydboholm, Hango, 48 bls. 82 rolls newsprint; Jacksonville Paper Co., Rydboholm, Hango, 25 bls. newsprint; Metropolis Paper Co., Rydboholm, Hango, 306 rolls newsprint; Jay Madden Corp., Rydboholm, Hango, 151 rolls newsprint.

NEW ORLEANS IMPORTS

WEEK ENDING MARCH 16, 1935

E. J. Keller Co. Inc., Wales Maru, ———, 625 bls. rags; Lagerloef Trading Co., Rydboholm, Hango, 520 bls. mechanical pulp; Lagerloef Trading Co., Rydboholm, Hango, 297 bls. sulphite; G. W. Rueff, Inc., Rydboholm, Hango, 495 rolls newsprint; E. C. Palmer & Co., Rydboholm, Hango, 84 bls. printing paper; E. C. Palmer & Co., Rydboholm, Hango, 179 rolls newsprint; Jay Madden Corp., Rydboholm, Hango, 565 rolls newsprint.

HOUSTON IMPORTS

WEEK ENDING MARCH 16, 1935

E. J. Keller Co., Inc., Alabama, ———, 63 bls. bagging.

1864 1935

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WOOD PULP AGENTS

PRICE & PIERCE, Ltd.,

60 EAST 42nd ST.
NEW YORK

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, March 20, 1935.

Conditions in the local paper market are fairly satisfactory. Demand for the various grades of paper continues moderately active. Sales forces of the leading paper organizations are receiving a good volume of inquiries and are generally optimistic over the outlook for the future.

The position of the newsprint paper market is practically unchanged. North American production for February amounted to 277,457 tons. The output for the first two months of the year showed an increase of 22,107 tons, or 4 per cent, over the corresponding period of 1934, according to the News Print Service Bureau.

Steadiness prevails in the fine paper market. Demand for the various grades is fairly persistent, including book, cover and writing papers. Prices continue firm. Tissues are moving in good volume for the season. The coarse paper market is exhibiting a strong undertone. Box board is in fair request.

Mechanical Pulp

The ground wood pulp market is marking time at present. Manufacturing operations in the United States, Canada and abroad are generally keyed to consumption and the statistical position of the industry is considered sound. Prices of domestic and imported mechanical pulp are holding up well and reports of concessions are infrequent.

Chemical Pulp

Paper mill demand for chemical pulp is rather quiet. Quotations on domestic and foreign bleached sulphite have declined $5 per ton; and easy bleaching sulphite is $4 per ton lower. Kraft pulp continues firm and bleached soda is steady and unchanged. Supplies are moving into consumption in fairly good volume.

Old Rope and Bagging

The old rope market is listless. Demand for domestic and imported old manila rope is light. Small mixed rope is moving slowly. Prices are somewhat easier. The bagging market is irregular. While scrap bagging is unchanged, gunny bagging is softer. Roofing bagging is in seasonal request.

Rags

Some improvement transpired in the domestic rag market. Demand for new cotton rags is better, especially for No. 1 white shirt cuttings and fancy shirt cuttings, which are also arousing export interest. Roofing grades are displaying strength. The position of the imported rag market is practically unchanged.

Waste Paper

The higher grades of paper stock are easier. White envelope cuttings are now offered at from $2.60 to $2.70; ordinary hard white No. 1 shavings at from $2.10 to $2.15; hard white No. 1 at from $1.90 to $2 and soft white No. 1 at from $1.70 to $1.80, all f.o.b. New York. The lower grades of waste paper continue soft.

Twine

With the approach of Easter the local twine market is more buoyant. Demand for the various varieties of twine is improving and the outlook for the near future is considered bright. Although competition for desirable orders is as keen as ever quotations are steady, in most instances.

New York Mills to Reopen

[FROM OUR REGULAR CORRESPONDENT]

BROWNVILLE, N. Y., March 18, 1935—Prominent paper mill men in this section look for a decided improvement in conditions during the remainder of the year and the outlook is claimed better now than any period since 1929. Production is being expanded by numerous concerns while other firms are anticipating better markets for their products. Within the next few weeks announcement relative to the reopening of the Oswegatchie Paper Mill at Gouverneur is expected following idleness of several years. An option to expire April 1, was recently taken on the property by a New England concern which recently had its plant demolished by fire and it is understood that the company is anxious to swing into action as soon as possible to supply its customers. It is reported that tissue paper will be produced.

The Philemon Creek Paper Company, purchasers of the old Harmon Paper Company, at Brownville, recently made another test operation producing a new kind of waxed wrapping paper which is claimed to be of high quality and it is rumored that operations will be resumed before the summer. Elmer T. Eshelman, of Syracuse, is president and treasurer of the company.

Plans are also under way for reopening the pulp mill of the Gould Paper Company, at McKeever, which has been shut down for several years. A force of men is placing the equipment in condition for operation. Three shifts of eight hours on a weekly schedule of forty hours are planned and about 30 men will be employed. Timber to be used for pulp will be transported by rail from Piercefield. The mill is expected to operate steadily.

Adopts New Type of Canal Barge

The Ontario Paper Company, Ltd., Thorold, Ont., has placed a contract with Swan, Hunter & Wigham Richardson Company, Ltd., Wallsend-on-Tyne, England, for the construction of a new type all-welded barge for operation on the St. Lawrence River and Great Lakes by the Quebec & Ontario Transportation Company, Ltd., an affiliated organization. The new vessel will be 259 feet long, 43 feet 10 inches wide, with molded depth of 22 feet. It will have a rated carrying capacity of 3450 short tons. There will be four hatches, each 26 x 30 feet, to provide rapid cargo-handling. The new barge will be built on the conduit system of construction and will be operated by two Diesel engine units, each of 500 horsepower rating.

Two Models for taking temperatures of Drying Rolls

No need to stop the machine when taking roll temperatures. The thermocouple strip of the Cambridge Surface Pyrometer conforms to the shape of the roller. Within five seconds a steady reading of temperature is obtained. The HAND MODEL is a self-contained instrument for use upon readily accessible moving rolls. The EXTENSION MODEL is used for those hard-to-reach surfaces. Both models are sturdy and accurate.

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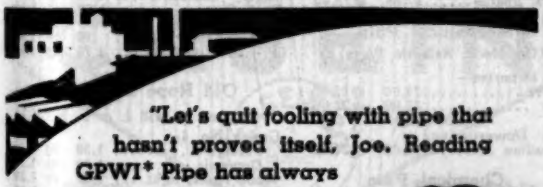

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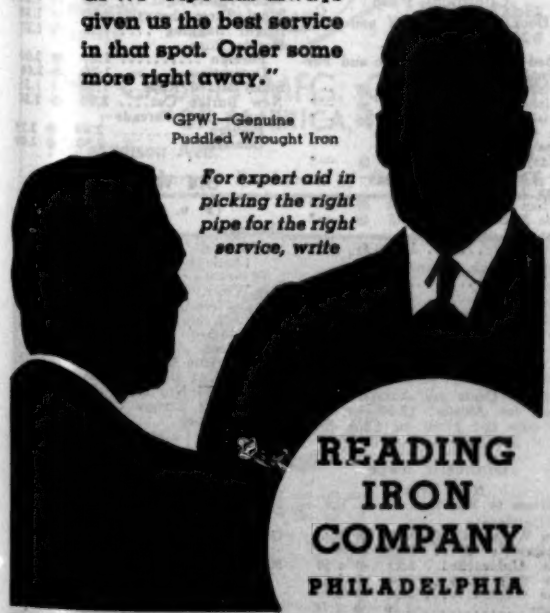

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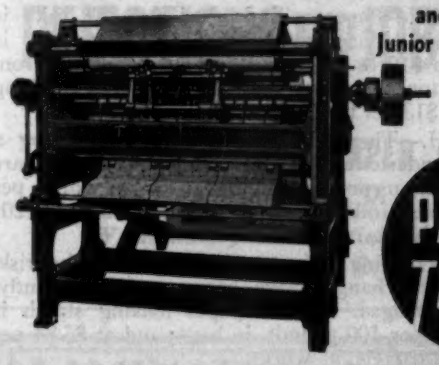
5220—Paper Trade Journal

FOR FOLDING STANDARD SIZE and Junior Sizes



PAPER TOWELS

full rotary-ball bearing interfolder

Simply constructed, the upkeep of this machine is next to nothing, although the guaranteed production is 25 cases per hour. Illustrated here is the standard three wide towel interfolder, but this machine can also be built so that it is one, two, three, four or five wide with production of 12 cases for single width up to approximately 40 cases on the five wide machine. Towels are slit to their proper size with a score cut slitter running on a hardened surface roll, which gives the ends a smooth shearlike cut. The cut-off mechanism is a full rotary mechanism making a saw tooth cut.

Complete details upon request.

Paper Converting Machine Co., Green Bay, Wisconsin

Designers and manufacturers of High Speed Rotary Folders for napkins, towels and toilet paper; Rotary printing presses for napkins, bags, envelopes; Creping machines, bundling presses and special converting machinery.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, March 20, 1935.

BLANC FIXE.—Steadiness prevails in the blanc fixe market. Prices are holding to previously quoted levels. The pulp is quoted at from $42.50 to $45 per ton, in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—The bleaching powder market is moderately active. Shipments against contract are moving rather slowly. Prices remain steady and unchanged. Bleaching powder is quoted at from $1.90 to $2.15 per 100 pounds, in drums, at works.

CASEIN.—The casein market is fairly active. Domestic standard ground is quoted at 12½ and finely ground at 13 cents per pound; Argentine standard ground at 13¾ and finely ground at 14 cents per pound, and French standard ground at 13¼ and finely ground at 13½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Demand for caustic soda is somewhat restricted at present. Prices are holding to schedule. Solid caustic soda is quoted at from $2.60 to $3.10; while the flake and ground are selling at from $3 to $3.05 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is marking time. Contract shipments are moving in fairly good volume. Imported china clay is quoted at from $13.50 to $21 per ton, ship side; while domestic paper making clay is selling at from $6.50 to $12 per ton, at works.

CHLORINE.—Conditions in the chlorine market are fairly satisfactory. The contract movement is seasonal. Prices continue steady. Chlorine is quoted at from $2 to $2.40 per 100 pounds, in tanks, or multi-unit cars, in ton lots, or over, at works.

ROSIN.—The rosin market is fairly steady. Paper making gum rosin is quoted at $4.65 and wood rosin at $4.60 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.63 per 100 pounds, in tank cars, at works.

SALT CAKE.—Paper mill demand for salt cake is fairly persistent. Prices are unchanged. Salt cake is quoted at from $12 to $13 and chrome salt cake at from $11 to $12 per ton, at works. Imported salt cake is selling at from $12 to $13 per ton, on dock.

SODA ASH.—The soda ash market is displaying a fairly strong undertone. Shipments against contract are normal. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—Trading in the starch market is fairly brisk. No radical price changes have been reported recently. Prices are unchanged. Special paper making starch is quoted at $3.75 per 100 pounds, in bags; and at $3.84 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—The sulphate of alumina market is exhibiting strength. Prices are holding to schedule. Commercial grades are quoted at from $1.35 to $1.50; while iron free is selling at from $1.90 to $2.05 per 100 pounds, in barrels, at works.

SULPHUR.—The sulphur market continues steady. Sulphur is quoted at $18 per ton on orders of 1,000 tons, or over, on yearly contracts; and at $20 per ton on any smaller quantity over that period. On spot and nearby car loads, the quotation is $21 per ton.

TALC.—Most of the business transacted in the talc market during the past week was along routine lines. Domestic talc is quoted at from $16 to $18 per ton, at eastern mines.

Market Quotations

Paper

(F. o. b. Mill)

Ledgers	6.50	@	—
Bonds	6.00	@	—
Index	6.00	@	—
Writings—			
Extra Superfine	6.50	@	—
Superfine	6.25	@	—
Tub sized	5.75	@	—
Engine sized	5.50	@	—
Book, Cased—			
S. & S. C.	5.35	@	5.75
S. & S. C. Litho	5.60	@	6.00
M. F.	5.10	@	5.50
Coated and Enamel	5.90	@	6.55
Coated Litho	5.90	@	6.55
Tissues—Per Ream—			
White No. 1	.82½	@	.85
White No. 2	.67½	@	—
Anti-Tarnish M. G. only	1.00	@	—
Colored	.85	@	—
Kraft	.70	@	—
Manila	.67½	@	.70
Manila—			
No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Butchers	4.00	@	4.50
Fibre Papers—			
No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75
Common Bogus	1.50	@	3.00
Screenings	2.50	@	3.50
Glassine—			
Bleached	.11	@	—
Unbleached	.09	@	—

(The following Quotations are Delivered New York)

News, per ton—			
Roll, contract	40.00	@	—
Rolls, spot	40.00	@	—
Sheets	45.00	@	—
Kraft—			
No. 1 Northern	4.12½	@	4.75
Standard	4.00	@	—
Southern	3.87½	@	—
Boards—per ton—			
News	40.00	@	45.00
Chip	37.50	@	40.00
Sgl. Mla. Ll. Chip	47.50	@	52.50
Jute Lined Chip	47.50	@	52.00
White Patent Coated	60.00	@	65.00
Binders Boards	67.00	@	75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	21.00	@	22.00
Dry	21.00	@	22.00

(F.o.b. Mill)

No. 1 Domestic and Canadian	18.00	@	24.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Division 1	2.60	@	—*
Division 2	2.55	@	—*
Division 3	2.50	@	—*
Prime Qualities—			
Class 1. All Prime Easy Bleaching	2.05	@	—*
Other Than Easy Bleaching—			
Class 2. Higher Than Standard	2.00	@	—*
Class 3, Standard	1.95	@	—*
Class 4. Lower than Standard	1.90	@	—

(On Dock, Atlantic Ports)

Kraft No. 1	1.70	@	1.80
Kraft No. 2	1.50	@	1.60

(F.o.b. Pulp Mill)

Kraft Domestic	1.70	@	2.35

(Delivered)

Soda Bleached	2.30	@	—

*Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	5.75	@	6.00
Silesias No. 1	3.75	@	4.00
New Unbleached	6.25	@	6.50
New Soft Blacks	3.00	@	3.25
Blue Overall	3.50	@	3.75
Fancy	2.50	@	2.75
Washables	1.75	@	2.00
Mixed Khaki Cuttings	3.00	@	3.25
O. D. Khaki Cuttings	3.75	@	4.00
Men's Corduroy	1.50	@	1.75
New Mixed Blacks	2.50	@	2.75

Old Rags

White, No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	@	3.25
White, No. 2—			
Repacked	1.75	@	2.25
Miscellaneous	1.50	@	1.75
Thirds and Blues—			
Repacked	1.50	@	1.75
Miscellaneous	1.25	@	1.50
Black Stockings	2.50	@	3.00
Roofing Rags—			
No. 1	1.20	@	1.30
No. 2	1.10	@	1.15
No. 3	.95	@	1.00
No. 4	.95	@	1.00
No. 5A	.80	@	.85

Foreign Rags

New Rags

New Dark Cuttings	1.60	@	1.70
New Mixed Cuttings	1.75	@	1.85
New Light Silesias	3.75	@	4.00
Light Flannelettes	3.75	@	4.00
Unbleached Cuttings	6.50	@	6.75
New White Cuttings	6.50	@	6.75
New Light Oxfords	3.25	@	3.50
New Light Prints	2.75	@	3.00

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	1.75	@	1.85
French Blue Linens	2.30	@	2.40
German Blue Linens	2.15	@	2.25
German Blue Cottons	1.70	@	1.80
Checks and Blues	1.30	@	1.40
Linsey Garments	1.40	@	1.60
Dark Cottons	1.00	@	1.10
Old Shopperies	.95	@	1.00
New Shopperies	.90	@	1.00
French Blues	1.70	@	1.90

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.50	@	1.60
Domestic	1.40	@	1.50
Wool Tares, light	1.20	@	1.30
Wool Tares, heavy	1.20	@	1.30
Bright Bagging	1.15	@	1.33
Manila Rope—			
Foreign	1.85	@	2.00
Domestic	1.75	@	2.00
Small Mixed Rope	1.10	@	1.35
New Burlap Cut	2.00	@	2.35
Hessian Jute Threads—			
Foreign	2.60	@	2.75
Domestic	2.80	@	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.60	@	2.70
Ordinary Hard White No. 1	2.10	@	2.15
Hard White No. 2	1.90	@	2.00
Soft White No. 1	1.70	@	1.80
Flat Stock—			
Stitchless	.65	@	.75
Over issue Mag.	.65	@	.75
Solid Flat Book	.45	@	.50
Crumpled No. 1	.35	@	.40
Solid Book Ledger	1.50	@	1.65
Ledger Stock	1.00	@	1.20
New B. B. Chips	.30	@	.35
Manilas—			
New Env. Cut	1.70	@	1.80
New Cuttings	1.31	@	1.45
Print	Nominal		
Bogus Wrapper	.40	@	.50
Container	Nominal		
Old Kraft Machine—			
Compressed bales	1.10	@	1.20
News—			
No. 1 White News	1.30	@	1.35
Strictly Overissue	.60	@	.65
Strictly Folded	.25	@	.30
No. 1 Mixed Paper	.15	@	.20

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KALIX TRÄINDUSTRI AKTIEBOLAG
Vanaförden, Sweden
MUNKSUNDS AKTIEBOLAG
Munksund, Sweden
NENSJÖ CELLULOSA A.-B.
Sprängsvikan, Sweden

Unbleached Sulphite

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Greaker, Norway
BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
CELLULOSEFABRIKS A.-G.
Bratislava, Czecho-Slovakia
SVANÖ AKTIEBOLAG
Svanö, Sweden

Bleached Sulphite

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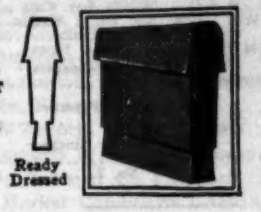

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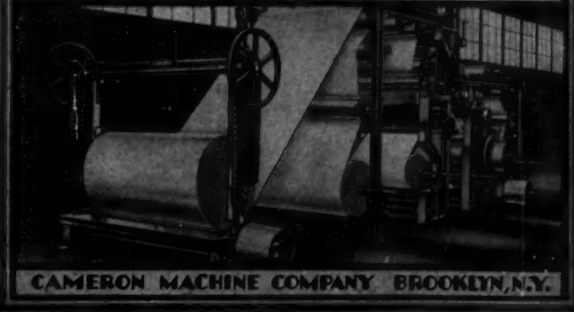
LAMINATING MACHINE

for combining paper, board, cloth etc.



CAMERON MACHINE COMPANY BROOKLYN, N.Y.

Twines
(F. o. b. Mill)

Coarse Polished—
India ..... .11¼@.13¼
Belg. White Hemp .12¼@.15¼
India Compress.... .11¼@.12¼
Fine Polishes—
Fine India ..... .18@.20

CHICAGO

Paper
(F. o. b. Mill)

Rag Bond ..... .13@.50
Water Marked Sulphite Bond ..... .06¼@.11
Sulphite Bond ..... .05½@.11
Superfine Writing .... .18@.24
No. 1 M. F. Book.. .06½@.07¼
No. 3 M. F. Book.. .05¼@.06¼
No. 1 S.&S.C. Book .06¼@.07¼
No. 2 S.&S.C. Book .05¼@.06½
Coated Book ..... .07@.12
Coated Label ..... .07@.08¼
No. 1 Manila ..... .04¼@.05¼
No. 1 Fibre ..... .04¼@.05¼
No. 2 Manila..... .04¼@.04¾
Butcher's Manila.... .03¼@.03¾
No. 1 Kraft ..... 4.75@5.00
Southern Kraft ..... 3.88@4.25
No. 2 Kraft..... 3.88@4.25
Wood Tag Boards... .04¼@.06¼
Sulphite Screenings.. .03@.03¼
Manila Tissue ..... .05¼@.07
White Tissue ..... .07@.09
(Delivered Central Territory)
News, per ton—
Rolls, contract....41.00@—
Sheets, open.....46.00@48.50
Boards, per ton—
Plain Chip.....46.50@—
Solid News.....50.00@—
Manila Lined Chip...55.00@—
Patent coated.....65.00@—
Container Lined—
85 Test, per 1000 sq. ft..... 1.70
100 Test, per 1000 sq. ft..... 1.85

Old Papers
(F. o. b. Chicago)

Shavings—
No. 1 White Envelope cuttings ... 1.70@2.00
No. 1 Hard White. 1.40@1.65
No. 1 Soft White.. 1.25@1.50
Ledger & Writings.. .70@.80
Solid Books..... .60@.70
Blanks ..... 1.00@1.05
Krafts ..... .80@.90
New Kraft Cuts..... 1.20@1.30
Manila Env. Cuts ... 1.25@1.30
Ex. No. 1 Manila... .90@1.00
Print Manila..... .40@.50
Overissue News..... .40@.45
Old Newspapers—
No. 1 ..... .30@.35
Mixed Papers—
No. 1 ..... .15@.20
Roofing Stocks—
No. 1.....30.00@—
No. 2.....28.00@—

PHILADELPHIA

Paper
(Delivered Philadelphia)

Bonds ..... .05-9/10@.38
Ledgers ..... .06 9/10@.40
Writings—
Fine No. 3 ..... .05@.06
Superfine ..... .10@.18
Extra Fine ..... .15@.20
Fine ..... .15@.24
Fine, No. 2 ..... .10@.25
Book, M. F. ..... .05¼@.06½
Book, S. S. & C. ... .05@.07¼
Book, Coated ..... .06½@.09
Coated Lithograph .. .06¾@.08½
Label ..... .07@.11
No. 1 Jute Manila .. 6.25@—
Manila Sul., No. 1 .. 5.25@—
Manila No. 2 ..... 3.00@—
No. 1 Kraft ..... 5.00@—
Southern Kraft ..... 4.75@—
Common Bogus..... .03@.04½
News Print Rolls....40.00@—
Straw Board.....40.00@45.00
News Board.....40.00@—
Chip Board.....37.50@—
Wood Pulp Board...70.00@85.00
Binder Boards—
No. 1, per ton.....75.00@80.00
No. 2, per ton.....70.00@75.00
Carload lots.....65.00@70.00
Tarred Felts—
Regular .....$2.25@$4.25
Slaters (per roll).. .84@.94
Best Tarred, 1-ply (per roll)..... 1.95@2.10
Best Tarred, 2-ply (per roll)..... 1.50@1.60
Best Tarred, 3-ply... 2.00@2.25

Domestic Rags (New)
(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—
New White, No. 1. .03½@.04
New White, No. 2. .02½@.04
Light Silesias..... .02¾@.03
Silesias, No. 1..... .03@.03½
Black Silesias, soft. .02½@.03
New Unbleached.. .05@.03½
Washable, No. 1.. .01½@.02
Blue Overall ..... .03½@.04
Cottons—According to grades—
Washable, No. 2.. .02½@.03
New Blue..... .01½@.03
Fancy ..... .01½@.03
New Black Soft... .03@.04
New Light Seconds .01¾@.02
New Dark Seconds 1.50@1.75
Khaki Cuttings—
No. 1 O.D..... .03@.04
No. 2 Mixed..... .03@.04
Corduroy ..... .02@.03
New Canvas..... .03½@.04½
New Black Mixed. .02½@.03½

Domestic Rags (Old)

White No. 1—
Repacked ..... 2.50@3.50
Miscellaneous .... 1.75@2.25
M. G. ..... 3.00@3.75
Thirds and Blues—
Miscellaneous ..... 1.00@1.50
Repacked ..... 1.50@2.00
Black Stockings (Export) ..... 2.00@3.50
Roofing Stock—
Foreign No. 1..... .50@.75
Repacked ..... .70@.85

Bagging
(F. o. b. Phila.)

Gunny, No. 1—
Foreign ..... 1.25@1.50
Domestic ..... 1.50@1.75
Manila Rope..... 2.00@2.25
Sisal Rope ..... 1.25@1.50
Mixed Rope..... 1.00@1.10
Scrap Burlaps—
No. 1..... 1.25@1.50
No. 2..... .80@1.00
Wool Tares, heavy.. 2.75@—
Mixed Strings..... 1.15@1.25
No. 1 New Light Burlap ..... 2.25@2.50
New Burlap Cuttings 2.00@2.25

Old Papers
(F. o. b. Phila.)

Shavings—
No. 1 Hard White. 2.25@2.30
No. 2 Hard White. 1.90@2.00
No. 1 Soft White.. 1.80@1.85
No. 2 Soft White.. 1.25@1.30
No. 1 Mixed..... —@.75
Solid Ledger Stock.. 1.50@1.60
Writing Paper..... 1.00@1.10
No. 1 Books, heavy.. .55@.60
No. 1 New Manila.. 1.35@1.40
Print Manila ..... .50@.60
Container Manila.... .45@.50
Old Kraft..... 1.00@—
No. 1 Mixed Paper.. .20@—
Straw Board Chip... .20@—
Binders Board Chip. .20@—
Corrugated Board... .40@—
Overissue News..... .50@—
Old Newspapers..... .30@—

BOSTON

Paper
(F. o. b. Mill)

Ledgers—
Sulphite ..... .06@.12½
Rag Content ..... .12@.30
All Rag ..... .36@.52½
Bonds—
Sulphite ..... .07¼@.11
Rag Content ..... .12@.30
All Rag ..... .36@.65
Writings ..... .06½@.20
Superfines ..... .11@.31
Book, Super ..... .06@.09
Book, M. F. ..... .05½@.08½
Book, Coated ..... .08½@.18
Coated Litho ..... .09@.12
Label ..... .09½@.15
Jute Manila No. 1 . .11@.13
Manila, Sul. No. 1 . .04¾@.06½
Manila, Sul. No. 2 . .03¾@.04½
No. 1 Kraft..... .04¾@.05
No. 2 Kraft..... .04½@.04¾
(F. o. b. Boston)
Southern Kraft..... .03¾@.04¼
(F. o. b. destination in carload lots, f. o. b. mill in less than carload lots.)
Common Bogus .... .02@.02¼
(Delivered New England points)
News Print Rolls....39.50@—
Straw Board, rolls.009 —@35.00
Straw Board in Sheets, basis 35s to 70s ..... —@40.00
Filled News Board..40.00@45.00
Chip Board .....37.50@40.00
Chip Board (Creasing) .....37.50@40.00
Single Manila Lined Chip .....47.50@52.50
Single White, Patent Coated News Board (Bender) .....55.00@65.00
Wood Pulp Board ..70.00@75.00
Binder Boards (Standard Grade).....67.00@75.00

Old Papers
(F. o. b. Boston)

Shavings—
No. 1 Hard White. 2.00@2.20
No. 1 Soft White.. 1.75@1.90
No. 2 Mixed..... .75@.80
Solid Ledger Books.. 1.75@—
Overissue Ledger Stock ..... 1.15@1.30
Mixed Ledgers ..... .95@1.05
No. 1 Books, heavy.. .55@.65
No. 1 Books, light.. .50@.60
Crumpled Stitchless Book Stock..... .50@.60
Manila Env. Cuttings 1.25@1.30
No. 1 Old Manila... .60@.65
White Blank News.. 1.15@1.20
No. 1 Kraft..... .95@1.00
No. 1 Mixed Papers. .20@—
Print Manila..... .40@.45
Overissue News..... .45@.50
Old Newspapers..... .22½@.20
Box Board Chips.... —@.25
Corrugated boxes.... .35@.40
Screening Wrappers.. .45@.55

Bagging
(F. o. b. Boston)

Manila Rope—
Foreign ..... 1.70@1.80
Domestic ..... 1.90@2.00
Transmission Rope.. .90@1.00
Mixed Strings..... .25@.30
Jute Rope ..... 1.35@1.40
Jute Carpet Threads .65@.70
Gunny No. 1—
Foreign ..... 1.50@1.60
Domestic ..... 1.25@1.35
Bleachery Burlap.... 4.00@4.50
Scrap Burlap..... 1.05@1.15
Scrap Sisal ..... 1.00@1.10
Scrap Sisal for Shredding ..... 1.10@1.25
Wool Tares, heavy . 1.25@1.30
New Burlap Cuttings 1.45@1.50
Australian Wool Pouches ..... 2.00@2.25
Heavy Baling Bagging ..... 1.40@1.50
Paper Mill Bagging.. .90@1.10
Bagging No. 2 ..... .50@.55

Domestic Rags (New)
(F. o. b. Boston)

Shirt Cuttings—
New Light Prints .01¾@.02
New White No. 1. .05½@.06
New White No. 2. .03½@.04
Silesias No. 1..... .04@—
New Black Silesias .02½@.03
New Unbleached.. .05½@.06
Blue Cheviot .... —@4.65
Fancy ..... .0185@.0195
Washable ..... .0165@.0170
Cottons—According to grades—
Blue Overalls ..... —@.03¾
New Black, soft..... .04@.04½
Khaki Cuttings..... .03¾@.03½
O. D. Khaki..... .03@.03¾
Corduroy ..... .01¾@.02
New Canvas..... —@.03
B.V.D. Cuttings..... —@.06¾

Domestic Rags (Old)
(F. o. b. Boston)

Canvas ..... .04½@—
White No. 1—
Repacked ..... —@3.00
Miscellaneous ..... 2.50@2.75
White No. 2—
Repacked ..... 2.00@2.75
Miscellaneous .... 2.00@2.25
Twos and Blues..... 1.25@1.50
Thirds and Blues
Repacked ..... 2.00@2.75
Miscellaneous .... 2.00@2.25
Black Stockings .... 2.50@3.00
Roofing Stock
No. 1..... 1.17½@1.23½
No. 2..... .92½@1.00
No. 3..... .72½@.90

Foreign Rags
(F. o. b. Boston)

Dark Cottons..... 1.00@1.10
New White Shirt Cuttings ..... 5.50@6.00
Dutch Blues..... 2.00@2.50
New Checks & Blues 2.50@3.00
Old Fustians ..... 1.55@1.60
Old Linsey Garments ..... 1.35@1.45

TORONTO

Paper
(F. o. b. Mill)

Bond—
No. 1 Sulphite.... .10½@—
No. 3 Sulphite.... .08½@—
No. 1 Colored.... .10¾@—
No. 2 Colored.... .09@.10
Ledgers (sulphite)
Ledgers, No. 1 .... .24½@—
Ledgers, No. 3 .... .23½@—
Writing ..... .09@.09½
Book—
No. 1 M. F. (Carloads) ..... 6.20@—
No. 3 M. F. (Carloads) ..... 5.70@—
No. 4 M. F. (carloads) ..... 4.75@—
No. 1 S. C. (carloads) ..... 6.65@—
No. 3 S. C. (carloads) ..... 6.20@—
No. 4 S. C. (carloads) ..... 5.30@—
No. 1 Coated and Litho ..... 12.00@—
No. 2 Coated and Litho ..... 10.50@—
No. 3 Coated and Litho ..... 9.50@—
Coated tinted ..... 14.00@—
Wrapping—
Rag Brown..... 4.25@—
White Wrap..... 2.22½@—
"B" Manila ..... 4.75@—
No. 1 Manila..... 5.25@—
Fiber ..... 5.25@—
Kraft, M. F. .... 5.75@—
Kraft No. 2..... 5.25@—

(F.O.B. Cars Toronto)
News, per ton—
Rolls (contract)...39.50@—
Sheets .....42.00@—

Pulp
(F. o. b. Mill)

Ground Wood.....18.00@20.00
Sulphite easy bleaching .....40.00@—
Sulphite, news grade.38.00@—
Sulphite, bleached....50.00@55.00
Sulphate .....50.00@—

Old Waste Paper
(In carload lots, f. o. b. Toronto)

Shavings—
White Env. Cut .. 2.00@2.30
Soft White ..... 1.60@1.90
White Blk. News.. 1.25@1.40
Book and Ledger—
Flat Magazine and Book Stock (old) .90@1.00
Light and Crumpled Book Stock. .80@.90
Ledgers and Writings ..... 1.00@1.03
Manilas—
New Manila Cut.. 1.25@1.40
Printed Manilas.... .50@.60
Kraft ..... 1.00@1.20
News and Scrap—
Strictly Overissue.. .40@—
Strictly Folded.... .50@—
No. 1 Mixed Paper.. .40@—

Domestic Rags
(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings ..... .06@—
Fancy Shirt Cuttings .03@—

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TRADE MARK

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BENNETT INCORPORATED

CAMBRIDGE, MASS., U. S. A.

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1935-1936

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